

PC
MAGAZINE

**EDITORIAL
LIBRARY**
REFERENCE
DO NOT
REMOVE

DE TO IBM PERSONAL COMPUTERS

FIRST
LOOK
AT JAVELIN

Volume 5 Number 1
\$2.95

January 14, 1986

**Beyond 640K:
PC Labs Tests
Expanded/Extended
Memory Boards**

**Paradox: A Database
Manager with a
Spreadsheet Format**

**The Copy
Protection Wars:
A Report from
The Front**

THE
BEST
OF
1985



*PC Magazine
Picks the Most
Memorable
Hardware and
Software
Of the Year*



Tecmar turns multifunction into MegaFunction™!

Multifunction is multifunction. But how about a full-feature 384K card plus nearly one megabyte of non-volatile RAM disk at the same low multifunction board price? That's Tecmar's **MegaFunction™** — big enough to store your favorite software like Lotus 1-2-3™ and Wordstar™ on a single board, and run them at hard disk speed.

A Big Head Start. No more waiting to boot from your floppy. No more waiting to load Lotus 1-2-3. No more waiting to switch from Lotus to Wordstar. And a dramatic decrease in time required to search large files or documents. All because MegaFunction's non-volatile RAM disk eliminates time wasted accessing hard disks or floppies.

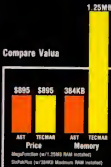
A Long Memory. MegaFunction's memory just won't quit. An external power supply is included to keep your work safely in non-volatile RAM — which means your programs won't disappear when you turn off your computer. So you're ready to run again with the flick of a switch! And if you want even more memory, add the optional daughter board to increase RAM capacity to 3.25 megabytes.



Compare Us To The Competition

Features	Tecmar MegaFunction	AST StarPlus™
Main Board RAM Maximum	1.25MB	384KB
Daughter Board RAM Maximum	2.00MB	Not Available
Maximum RAM	3.25MB	384KB
Serial Port	Standard	Standard
Parallel Port	Standard	Standard
Clock/Calendar w/Standby Battery	Standard	Standard
Supports IBM PC, XT, & Compatibles	Standard	Standard
ROM Boot from Electronic Disk	Standard	Not Available
Board Memory Volatility	Non-Volatile	Volatile
External Board Power Supply	Standard	Not Available
Data Transfers	DMA (Fast)	Not Available
Price	\$895	\$895

A Really Big Deal. We didn't forget all the other reasons for buying a multifunction board for your IBM PC, XT, or compatible. Like a clock/calendar including built-in standby battery power. A serial port for your modem or mouse. A parallel port for the printer you need. And the FREE bonus of one of the most popular multifunction software packages — Tecmar's Treasures Chest™ of Software, including programs for an electronic address book, calculator, and calendar.



Save Big Bucks. MegaFunction gives you the speed of a hard disk at the price of a multifunction board. Which means you get full functionality and a RAM disk for the same price as the leading add-on card. Check our features against the competition — then call us at (216) 349-1009 for the location of the dealer nearest you.

Why settle for multifunction when you can have MegaFunction — megabytes PLUS multifunction!



Copyright 1985, Tecmar, Inc.
AST StarPlus is a trademark of AST Research.
Lotus 1-2-3 is a trademark of Lotus Development Corporation.
MegaFunction is a trademark of Tecmar, Inc.
Wordstar is a trademark of Micropro International Corporation.

TECMAR

The Power Behind Your PC

6225 Cochran Road, Solon, Ohio 44139
Phone: (216) 349-1009 Telex: 466692

**SUPERCHARGE
YOUR PC INTO
AN AT WITH
MOUNTAIN'S NEW
\$795 RACECARD.**



Let David Rose tell you about our powerful new ProKey4.0.



David Rose, inventor of ProKey

Spend 2 minutes learning how to add a powerhouse of function to your keyboard with a terrific new version of ProKey!

"Suddenly others have discovered what RoseSoft has known since we invented the ProKey concept. If your keyboard could work a whole lot harder, your life would be a whole lot easier.

The original idea behind ProKey was a program that would let you store strings of keystrokes you could recall at a touch. Now there's ProKey 4.0 and it's better than ever."

ProKey 4.0 keyword macros unsnarl PC use.

"If you're a serious PC user, you probably use a variety of software programs. Spreadsheet. Word processing. Database. Communications. Plus the special-function programs you use to run your business or department.

And all these programs have different complicated commands that are tedious to type and easily forgotten. How much easier life would be if all you needed to operate your program was a small vocabulary of sensible words.

Want to log onto Dow Jones with your communications package to check on how your IBM stock is doing? Just type the keyword you previously selected for this function, "IBM". Need to print a profit and loss statement? Typing "p&l" is all it takes.

Behind the scenes, ProKey 4.0 checks its memory for the string of commands required to carry out the task and executes them automatically. Forgotten what functions you have available? Just call up the built-in menu that describes them in plain English.

Need to add a function? Enter the commands. Enter a description. Store them both away without leaving the program you're working with.

Built-in editing, English language menus, multi-character macro names and the ability to instantly change sets of functions. These are just four of the exciting new features that make ProKey 4.0 the most powerful macro processor you can buy."

ProKey 4.0 lets you customize your keyboard.

"Only ProKey has the unique Layout program that lets you redesign your keyboard to correct design flaws the manufacturers built in. You can change the location of any key, create a DVORAK layout, or make a duplicate set of arrow keys away from the keypad."

ProKey Is the Industry Standard.

"ProKey has all the features you need to make your life a whole lot easier. And RoseSoft has three years experience supporting customers who use macros. Including over 80% of the Fortune 100.

Don't be misled by the recent claims of ProKey imitators; they're comparing themselves against old versions of ProKey.

The choice is simple. Do you want an unknown, untested product in its first generation, or ProKey 4.0's power and features? The difference in price will hardly pay for dinner. The difference in performance is like night and day."

ProKey 4.0 runs on IBM and other compatible MS-DOS computers, and works with 99% of the software they use. \$130 suggested retail price at software dealers everywhere. Or call RoseSoft. (206) 524-2350.



RoseSoft™

4710 University Way N.E.
Seattle, WA 98105
(206) 524-2350



MICROSOFT WORD, VERSION 2.0

Microsoft's contribution to my writing productivity has been significant this year. Version 2.0 of *Microsoft Word* is more in line with the way I think documents should be formatted and printed than any other word processing product I have used (see "Word Takes Another Forward Stride," *PC Magazine*, Volume 4 Number 13).



If *Word's* formatting talents were not enough to make me more productive, its deadily accurate printing and style sheets would finish the job. *Word* allows an enormous amount of printing flexibility, yet it prints more accurately than most competitors. And *Word's* talents with laser printers are nearly legendary.

Word's style sheets are the answer to any business user's need for consistent document formatting. Each style sheet can store 128 formatting characteristics for use in any part of any document. If a policy change requires a format to be altered, it is a trivial matter to change one or more components of a style sheet and make the new format apply universally to all future documents.

I've used word processors that appear to work faster on-screen. But *Word's* excellent and consistent design speeds up the whole process of word processing.

—John Dickinson

FACT FILE: *Microsoft Word, Version 2.0*, Microsoft Corp., 10700 Northup Way, P.O. Box 97200, Bellevue, WA 98009 (206) 828-8080. List Price: \$375. Requires: 256K RAM; DOS 2.0 or later; two double-sided disk drives; one hard disk; XT, AT, or compatible. CIRCLE 638 ON READER SERVICE CARD

APPLE LASERWRITER

Laser printers are popping up like mushrooms, so why single out this one? Because the Apple LaserWriter represents a whole new opportunity for cost-effective applications in the workplace.

The LaserWriter is the first under-\$10,000 printer capable of coming



close to commercial typesetting, making in-house corporate publishing a realistic proposition (see "Words into Type: Meeting the Corporate Challenge," *PC Magazine*, Volume 4 Number 25). Using PostScript, the printer language built into the LaserWriter, you can specify complex arrangements of different type sizes, fonts, lines, and graphic elements.

As more software supporting PostScript becomes available, more companies will turn to micros and laser printers to prepare copy for publication. In some cases, these systems will be used to develop final layout designs before sending the work out for professional typesetting. In many cases, however, the final output from the in-house system will be acceptable, and outside suppliers will be eliminated entirely.

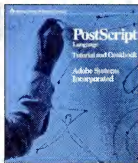
—Alfred Poor

FACT FILE: Apple LaserWriter, Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014 (408) 996-1010. List Price: \$6,995. CIRCLE 638 ON READER SERVICE CARD

ADOBE SYSTEMS' POSTSCRIPT

PostScript, a machine-independent page-description language from Adobe Systems, could be this year's ultimate diplomat, smoothing out the mangled relationship between software and printers. At present, printed output is the software developer's nemesis. A specific set of instructions called a driver must be written for every individual printer and plotter that a given piece of software is meant to work with. But not anymore.

PostScript will orchestrate the cacophony so that PCs can use different output devices interchangeably. Text and graphics are treated in the same manner so that an entire page layout can be specified at once. PostScript standardizes the commands used to access printer features (such as bold, italic, various fonts, and graphics) and does so in an extremely memory-efficient and speedy manner. PostScript lives as the resident software in the reprinter, so all your PC software requires is a single driver that can talk to any PostScript printer. Different printers, from mechanical



dot matrix printers to 300-dot-per-inch laser printers to high-end typesetters, can all output from the same PC. In the PostScript era, you won't have to choose a printer based on backward compatibility. Instead, you'll concentrate on desired features, such as print quality and speed.



THE BEST OF 1985

And Some of the Worst

As the curtain falls on 1985, PC Magazine's writers take a look at the year's highlights and low points. Here are the year's best products and a few of its dogs.

The world will recall 1985 as a year of hijackings, plane crashes, and earthquakes, but you may fondly remember it as the year *RBASE 5000* or *Top View* or the COMPAQ Deskpro was released.

The year 1985, like every year since IBM introduced its first personal computer, brought hundreds of new products for the PC. Last year's bounty was particularly notable for the first significant crop of AT clones, for some good software at bargain prices, and for laptop computers with readable screens.

Of course, every PC user has his or her own favorites—after all, the only thing we can all agree on is to disagree. So,

once again, we've asked *PC Magazine* editors and writers to nominate the outstanding products of the year. Their choices range from high-end laser printers to inexpensive desktop programs, from games to programmers' tools. We think each one is worthy of the title "Best Product of the Year."

And, like last year, with tongue in cheek, we've searched out some of the worst ideas of 1985—some of the more outrageous turkeys that our cherished hardware and software developers tried to sell us throughout the year.

What follows is a purely subjective look at some of the best and worst products that 1985 offered to PC users. ■

On March 30, 1985, the freighter **MERCEDES** was deliberately dynamited and sunk, becoming an artificial reef and diving wreck.

Boca Raton, home of the IBM PC
needs a fishing and diving reef too.

The Great Recall: IBM PC-AT Hard Disk Drives

We're gonna deep-six thousands of 'em.
Simply because that's where they belong.

BUY A DRIVE, GET A REEF.

We'll allow you a \$1,000 rebate on the CORE ATplus40™ High Performance hard disk upgrade kit, when you send us your IBM PC-AT factory issue hard disk drive.

Help us build the world's first low-technology artificial reef.

The ATplus40™ drive has double the capacity of the standard IBM 20MB drive, runs 30% faster, and has reliability second to none.

It sells for \$2,595.

With the \$1,000 Rebate, your effective cost is \$1,595. Even compared to IBM's newest drive (30MB) we are still 30% faster, hold 10MB more, and cost \$400 less.

DRIVE FAILURE: NOT "IF?", BUT "WHEN?"

We feel it is time to consider your alternatives.

You already know about the IBM factory-issue drives' problems.

Problems like losing five or six pages of a spreadsheet. And the template for it that took two weeks to create.

Problems like important correspondence and contracts disappearing from the word-processing files. And problems like lost Accounts Receivable, or worse. Payroll records.

How about the random failures, the thousands of users that are progressively losing data — part of a file here, two files there.

THE CRASH OF '86.

InfoWorld, a highly respected computer weekly, conducted an intensive evaluation of IBM's hard disk and CORE's ATplus™ 20MB drive. They went beyond routine speed and technical comparisons, evaluating resistance to head crashes with destructive testing.

Like bumping, dropping and slamming the drives while the computer was in use.

"...[I]f the IBM drive was the only unit that failed every bump test, destroying data and developing bad bytes with even the gentlest of the tests. Because the jostling of test 1 is fairly common in offices, the chances of your losing data with the [IBM] drive are good with only normal, regular use, precisely the problem reported by many AT users. During the [more severe] test 2, the [IBM] disk came close to self-destruction. We do not recommend its use."

In summary, they said, "...the hard disk drives supplied as standard in the [IBM] AT are unreliable, destroying data and requiring many trips to service centers for reformatting and exchanges."

AN EDITOR'S ODYSSEY.

"The bottom line is that IBM is not maintaining the reputation for quality products that has made it so successful in the business world," says John Dickinson, a contributing editor to PC Magazine, a leading periodical for IBM personal computer users.

Consider his AT hard disk ordeal. His original AT Enhanced model's hard-disk began failing after six months of light use.

Two replacements from IBM also failed to perform.

The third IBM drive failed to write most of a word-processing file.

While he goes into much detail in

the story, Mr. Dickinson concludes that, "There have been plenty of 'authoritarian' reasons given in the press about the cause of the AT's disk problems— none of course, come from IBM. Wherever they come from, my experiences support all the popular theories..."

EASY MONEY.

Buy the ATplus40™. Everything is supplied, your ATplus40™ is designed for you to install, probably in less than a half-hour.

No technicians are necessary. We include free, CORE's special COPY program so you can painlessly copy all your programs and data from the factory-issue drive to the co-installed ATplus40™.

Then remove the IBM 20MB drive, pack it using the ATplus40™ box, and return it to CORE prepaid. Upon our receiving your old IBM 20MB drive, we'll send you a check in the amount of \$1,000.

It's that easy!

SEAL OF APPROVAL.

InfoWorld's testing the ATplus™ in comparison with the IBM drive actually confirms exactly what we have been saying all along: "Now you can build the IBM PC-AT that IBM didn't."

CORE's ATplus™ passed all of their tests. InfoWorld went on to say, "CORE's hard disk drive is built like a Sherman tank, offering exceptional per-

formance and reliability. Even novices should be able to install the kit, and technical support is good."

PC Magazine, in another in-depth article says, "CORE International's big, fast, rough add-in mass storage systems for the IBM PC-AT use proven technology to gain speed, [increase] capacity, and avoid the problems said to plague the AT's factory issue hard disk."

PEACE OF MIND.

We're the world's largest supplier of high-performance PC-AT compatible hard disk drives.

And respected magazines such as PC Week, InfoWorld and PC Magazine have told you how we got there.

ATplus drives are available from or in use by CompuLink, General Micro, MicroAge, Inacom, Businessland, Enron, NASA, GE, EXXON, the Department of Defense, the White House, Rockwell International, AT&T, major universities such as UCLA, USC, LSU, and get this — even IBM.

Our drives come with a full one-year warranty, centrally managed by CORE and supported by us and other major maintenance service companies.

ALL GOOD THINGS MUST COME TO AN END.

Like the Great IBM AT Hard Disk Recall.

So, before you suffer the agony of a drive failure, before you experience the tedium of restoring data to a dubious drive, before January 31 rolls around...get in on the Great IBM AT Hard Disk Recall.

Call us, or see your local dealer.

Now available for
PC-XT and Compatibles

CORE
INTERNATIONAL

• 7171 North Federal Highway Boca Raton, Florida 33431
Telex: 315 809 CORE INTL DEBE

305/997-6055

technology, and quite frankly, manufacturers understand it better. Their better understanding, combined with some of the special head locking mechanisms, gives us peace of mind when we sell you one.

Power

Hard disks consume power. Our small, half-high hard disks consume so little power that you can use them with your existing IBM PC power supply. If you plan to use lots of slots, you'll want to increase your power supply to be safe. We offer the same amount of power for your PC that comes in the XT.

Our Customers

Some folks just never feel comfortable buying mail order. They forget that Sears began as a mail order house or that IBM is now into mail order. But, if it helps, here is a *partial* list of customers who have felt comfortable to buy from us.

IBM	Sears
American Express	Honeywell
U.S. Army	MIT
AT&T (Bell Labs)	RCA
Bausch & Lomb	Lockheed
Xerox	Sperdy

Easy to Install

If you're like most of us, raised on the boob tube rather than the Great Books, you'd rather see the movie than read the book. Well, now you can choose to read our installation manual or for only \$9.95 more, you can get a VHS or Beta video cassette showing the simple steps for installation.



Warranty

We offer you a one year warranty on our hard disks—the same as IBM on the AT and 90 days on the tape drives. (It's all the manufacturer gives us.) If



Complete Hard Disk Kits—(all transfer rates 5 Mbits/sec)

Formatted Storage Capacity in Mbytes	Height	Partial Media	Average Access	Comments	PC or PC/XT	AT
10	1/2	no	85 msec	Low power	\$ 395	N/A
10	1/2	yes	85 msec	Low power	\$ 495	N/A
21	1/2	yes	85 msec	Low power	\$ 595	\$ 495
21	1/2	yes	40 msec	Low power	\$ 895	\$ 695
21	Full	no	40 msec	Used in AT by IBM	\$1,095	\$ 895
21	Full	no	30 msec	CDC drive	\$1,495	\$1,295
32	1/2	yes	85 msec	Low power	\$ 895	\$ 695
32	1/2	yes	40 msec	Low power, fast	\$1,095	\$ 895
32	Full	no	40 msec	Used in AT by IBM	\$1,295	\$1,095
32	Full	no	30 msec	CDC drive	\$1,695	\$1,495
72	Full	no	30 msec	Ideal AT drive for LAN	\$2,195	\$1,995
144	Full	no	30 msec	2.72MB drives as one volume	\$3,995	\$3,795

Removable Hard Disk

10	1/2	90 msec	5 Mbits/s	\$ 1,095	N/A
----	-----	---------	-----------	----------	-----

Tape Systems and Subsystems

Formatted Storage Capacity	Height	Data Transfer Rate (b/sec)	PC or PC/XT	AT
60 Mbytes	1/2	NR	\$ 995	\$ 995
60 Mbytes Subsystem	1/2	NR	\$ 1,295	\$ 1,295
21 Mbytes (unformatted) Start/stop Subsystem	24	NR	\$ 595	\$ 595
26 Mbytes Floppy Tape* Subsystem	31	NR	\$ 749	\$ 749

Controllers

All of our hard disk and tape controllers are available separately. Please call for prices.

Subsystem Chassis

Any of our disk or tape units are available in an external subsystem for an additional \$250.00. You can mix & match any of our 1/2 high hard disks or tape drives together or add any single full height hard disk.

Power Supply

130 Watt Power supply

150 Watt Power supply

\$75.00*

\$125.00

*with the purchase of any drive

anything goes wrong with your tape or disk drive or hard disk, send it back in the box it came in. However, we have found that we can usually solve the problem over the phone. So call first for a return authorization number because we can't accept any returns without it.

Comes complete

All Express Systems products come complete with the appropriate software, tape and/or hard disk controllers, and cables where required. Hard disks are formatted and tested with the PC DOS of your choice. All drive sizes are formatted capacities.

If your application requires a stacking kit, power splitter cables, daisy chain cable, or some other variation, we'll supply these items at a nominal charge. We even ship our hard disks with Command Assist™, an on-line DOS-like manual to give you help with your DOS commands.

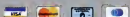
More questions?

Because we spend so much attention on the front end with ensuring that our disks will arrive in working order, we have a customer service department that, unlike many of our competitors, has little to do. When you need us, you won't get a constant busy signal.

Call our friendly, knowledgeable customer service staff to get answers to your questions—before or after the sale. Our people, who know the PC, can talk you through the sticky parts, and they'll respond to you quickly. Just call us.

How to order

Pick up the telephone and call 1-800-341-7549, to order. We accept Master Card, VISA, American Express and Diners Club. Or send a cashier's check or



money order (We'll take a check, but you'll have to wait for it to clear) and tell us if you want one of our recommended configurations or you want to mix and match yourself. Corporations with a DUNS number may send purchase orders for quantities over five.

EXPRESS SYSTEMS

Call Toll Free 1-800-341-7549 Ext. 1700

In Illinois call (312) 882-7733 Ext. 1700

Express Systems, Inc., 1254 Remington, Schaumburg, IL 60195

CIRCLE 383 ON READER SERVICE CARD



Low power Complete hard disk kit \$395

Comes complete with virtually the identical controller that's in the IBM® XT, and Xerox® warranties the hard disk for one year

Guaranteed 100 percent IBM PC compatible

How can we offer this fantastic price? Simple. We buy in such volume that even the most voracious hard disk businessmen understand they have to give us the best price possible. We could pocket the difference, but we don't.

Instead, we put the extra profit into our testing facilities. That's why Xerox guarantees our \$395 10 megabyte hard disk for one year.

Xerox knows, as our customers know, that we have an extensive testing program. Here is what we contribute toward giving you the maximum hard disk performance.

Best Drives Available

First, we buy the best drives available. Sounds trite, doesn't it? I mean, a drive's a drive—right? Hardly. You should see some of the junk we get in our labs. Some have such high failure rates that we even questioned our own \$10,000 hard disk tester. But when we tested other manufacturers' drives we were assured that our equipment was fine, which just confirmed that the bad hard disks were not only bad—they were real bad.

But that's just the weeding out process. We then take each drive that we've put through our tester and test it again with the controller you've requested. We call this a "tested pair."

DOS Doesn't Do It

In case you're thinking that all

this is an unnecessary duplication of what DOS does for you, let me explain the disk facts of life.

If DOS did what you may think it is supposed to do when you format the disk, DOS would map around these bad areas. Unfortunately, DOS doesn't do this.

DOS 2.0 and 2.1 can't enter the bad tracks. DOS 3.0 can, but only on the IBM AT. Unfortunately, as the press has so well documented, the AT's hard disk develops bad tracks later on.

We do what DOS can't

We believe the problem is so bad, we use a software program that performs a powerful test of your disk drive on all of the IBM or IBM compatible computers—PCs, XTs, and ATs. Our format takes hours to analyze the disk. But when we finish, you know that the bad tracks are really mapped out so you won't write good data that will disappear into a black hole. We even send you a printed statement of our test results.

Our software allows you to type in the bad track locations from the list supplied by the manufacturers, so you'll never write good data to them—even if DOS didn't identify them as bad. The software even lets you save the location of these bad sections to a file, so that you can reformat your disk without spending hours retesting.

We even include a program that will give you continuous comments on the status of your hard disk. No more waiting for that catastrophic failure.

Average Access Time

As you might suspect, some hard disks are faster than others in their ability to move from one track of data to another. The time it takes the hard disk to move one-half way between the beginning of the disk to the end is called the "average access time."

The first generation of 10 megabyte hard disks had average access times of 80-85 milliseconds (msec). But computer users love speed, and guess what—the average access time for the new 20 megabyte hard disk in the IBM AT is only 40 msec. (We sell an AT equivalent with only 30 msec access time!)

There are some legitimate reasons for the shorter access time. It's particularly helpful when there are multiple users on the same hard disk. It's also important when running a compiler. But remember, before you get too wrapped up in the access speed, there's always that ST 506 interface, which won't let data transfer from the hard disk to the computer any faster than 5 megabits/second. We've bypassed that choke hole, too. If you want the functional equivalent of a Ferrari with a turbocharger, order our 10 Mbit per second 100

megabyte hard disk with 18 msec of average access speed.

Compatibility

To be sure that your hard disk is 100 percent compatible with the IBM XT you don't need to buy the same hard disk that's in the XT. You can't even be sure what brand hard disk it is because IBM, like Express Systems, goes into the marketplace and buys hard disks from several vendors. However, they buy their XT hard disk controller from only one vendor—the same one we do.

You can buy the IBM XT controller from IBM for \$495 or you can buy from us, the functional equivalent, manufactured by the same company that makes it for IBM for only \$195. Is it the exactly identical IBM XT controller? No, it's better. First, it takes less power, and secondly, it can control from 5 to 32 megabytes—the IBM controller can work with only 10 megabytes. It is 100 percent IBM XT compatible, and 100 percent is 100 percent. If you want to save a slot, we carry a version that lets you operate two hard disks and two floppy disk drives.

More than 32 Megabytes

You can operate with more than 32 megabytes (the limit of DOS) through the use of "device drivers." Express Systems can supply you with device drivers for your hard disks for over 32 megabytes formatted. But if you don't have individual files, or databases that are large, you might want to consider one of our controllers that can divide our 65 megabyte (formatted) hard disk into two equal volumes of 32 megabytes each.

Reliability

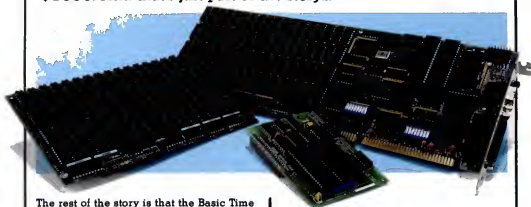
We offer you a choice between iron oxide and plated media—the stuff that covers the hard disk and gives it its magnetic properties. Iron oxide is...well, it's rust. If you inadvertently joust your disk, you may cause the low flying head to dig out some iron oxide. A little rust flake can ruin your whole day. Plated media is more resistant to damage, and if it happens, less data is lost.

We offer both types of hard disks. The iron oxide is older



AT4X4Plus— The Dreamboard For Your AT

Imagine 4 Megabytes of memory, serial & printer port, for less than \$1000. And that's just part of the story...



The rest of the story is that the Basic Time AT4X4Plus offers more expandability than competing boards, while Qubie® brings them to you at bargain prices. It's fully compatible with the IBM AT and compatibles - even those hot rod models running at up to 10 Mhz!

Mind Blowing Prices!

Standard configurations include one serial port, a parallel port, and your choice of memory from 128K (\$265) to 2 megabytes (\$595). That's right - 2 megabytes for the price some charge for a 128K board! Want more memory? Plug on an additional 2 megabyte RAMPACK for an additional \$395.

More Expandability

And like many other AT boards, a second serial port, and a game port are options. Unlike the others, a third and fourth serial port is available via the 4X4 - SerialPak.

Top Quality - Qubie® Service

With AT4X4Plus, you save money while buying the board with the best array of standard features and options available. It is made in the U.S.A. with top quality components which undergo extensive burn-in and test procedures. A one year limited warranty and the Qubie® No Risk Guarantee assures your satisfaction.

Basic Time AT4X4Plus Prices

AT4X4-128 128K, 1 serial, 1 parallel,	\$265
AT4X4-512 512K, 1 serial, 1 parallel,	\$365
AT4X4-1MB 1 meg, 1 serial, 1 parallel,	\$395
AT4X4-2MB 2 meg, 1 serial, 1 parallel,	\$395

AT4X4-2S Second Serial Port Option	\$40
AT4X4-RAM 2 Megabyte RAMPACK	\$395
AT4X4-SER SerialPak with 2 serial ports	\$129
AT4X4-GAME Game Option	\$25

The Qubie® No Risk Guarantee

If you are not completely satisfied with your AT4X4Plus within 30 days of purchase, you may return it for a full refund - including the freight to return it. And if you should ever have a problem during the one year warranty period, Qubie® will fix or replace your board within 48 hours of receipt.

All prices include UPS surface charges. For fast delivery, send cashier's check, money order, or order by Mastercard/Visa. Personal checks allow 18 days to clear. In a hurry? UPS Blue Label is just \$5.00. Company purchase orders accepted, call for prior authorization. California residents, add 6% sales tax.

Hours: M-F 9am-5pm Sat. 9am-12pm PTZ

London (01) 871-2855
Paris (01) 321-5316
Sydney (02) 579-3322
Canada (403) 438-0994



QUBIE®

4809 Calle Alto
Camarillo, California 93010

Outside California
800-821-4479

Inside California
805-987-9741

This... Will Bring You This



FREE!

It's PC Magazine's reader service program:
your key to all the product information you'll ever
need.

Simply fill out the reader service card located
in every issue of PC and our advertisers will send
you colorful brochures, specs and price
information.

Keep this information on-hand, and you'll
have your own reference library right at your
fingertips.

It's just one of the many benefits you get when
you subscribe to the one-of-a-kind PC Magazine.



the PC?" elsewhere in this issue).

Our political and military leaders have a childlike faith in American technological prowess. I can't help wondering whether President Reagan, Cap Weinberger, and the other backers of Star Wars have ever used a computer. For if they had ever done something as commonplace as buying a personal computer, uncrating it, plugging it in, booting it up, and running a few canned programs on it, they'd realize just how complicated and fickle even the finest machines can be. Under the best of conditions, computers occasionally fail; in the heat of battle, when the physical safety of both silicon and men are pushed to the limit, even the most carefully built and programmed computers will break down.

Computers are prone to many different kinds of errors, from the breakdown of integrated circuits (and some of America's leading chip manufacturers have been fined for neglecting to thoroughly test military components) to unforeseen software bugs. The Pentagon knows this but for obvious reasons has decided to ignore the whole subject. Here's a short list of some of the most notorious computer fiascos:

- In 1977, the World Wide Military Command and Control System flunked a major test. It failed to send messages 62 percent of the time, and the Readiness Command, a crucial arm of the system, broke down 85 percent of the time.

- In 1979, a computer operator inadvertently fed the wrong magnetic tape into the North American Aerospace Defense Command (NORAD) computer system. The tape, which contained a simulation of a Soviet attack, triggered every bell, whistle, and alarm at NORAD, but luckily the blunder was discovered before it was too late.

- Also in 1979, the crew of an Air New Zealand airliner heading for Antarctica fed the wrong routing data into the jet's navigation computer. Its visibility obscured by bad weather, the plane drifted 26 miles off course and crashed into a mountain. More than 200 people were killed. Some investigators suspect that a similar error in the entry of routing data led Korean Airlines flight 007 astray, with equally deadly consequences for its passengers and crew.

- And, in what is probably the most

costly programming error of all time, the first American Venus probe was lost owing to the inadvertent substitution of a period for a comma in a FORTRAN program. A NASA programmer wrote

```
DO 3 I = 1.3
```

when he should have entered

```
DO 3 I = 1.3
```

That seemingly inconsequential period sent the rocket, launched from Cape Canaveral on July 22, 1962, careering toward populated areas, and the rocket had to be destroyed. Despite NASA's intensive checking procedures, which are probably at least as good as the military's, the mistake went undetected during many months of testing and retesting.

The Strategic Computing Program wants to develop a new generation of intelligent weapons that could fight a battle, or even a war, with little or no human intervention.

Professional programmers try to write error-free code, but they're only human and bugs and omissions are inevitable. Such mistakes are insidious and invisible. An improperly programmed computer looks every bit as healthy as a properly programmed one; there are no loose screws dangling from the box or strange noises emanating from the chips. A software bug may lurk deep inside a program, utterly harmless until some computational event awakens it and causes it to wreak havoc. Even after a bug has cropped up, the goaf may be excruciatingly difficult to track down and fix, and then the programmer's Band-Aid may interact with other parts of the system in unexpected ways, causing still more bugs, and so on. Often only the original programmers can fully decipher their own code; in large systems, few people, if any, are familiar with the entire program.

There are ways to minimize errors, of course. One answer is programming languages that make it impossible to commit

simple syntactical errors, such as the one that killed the Venus mission; another is algorithms that test programs before they are put into operation. But there is no substitute for actual and repeated testing under real conditions.

While such testing may be possible for the autonomous tank and other weapons of the electronic battlefield, it isn't feasible for Star Wars. Such a system, designed to foil a massive attack from ICBMs, submarines, planes, and satellites, can only be realistically evaluated in actual combat. Simulations and small-scale battle tests won't do the job, no matter how frequently or rigorously performed. It is precisely in a war, when the system is fully engaged and taxed to the limit, that programming bugs and omissions emerge.

Star Wars is bound to be a billion-dollar paper tiger. But there are two things about the system that are far more disturbing than the vast waste of money and effort: the lies and illusions fostered by the Pentagon and its supporters in the computer industry and the academic establishment. In order to foil an attack, Star Wars must swing into action within minutes of a Soviet onslaught, which means that the system's computers must possess a great deal of decision-making autonomy in evaluating the attack and in orchestrating our initial response. There will be little time for the generals to confirm the warning and approve a counterattack—maybe not even enough time to get the President's permission. And, given the impossibility of property debugging the system, Star Wars may very well increase the chances of accidental nuclear war.

We are on the verge of entrusting our future to computers. As I said, the whole thing is a stupid idea.

Note: If you'd like to learn more about the computational pitfalls of the Star Wars computer system, Computer Professionals for Social Responsibility (CPSR) publishes an excellent paper on the subject, written by two former computer science professors now employed by the Digital Equipment Corp. The paper, "The Star Wars Computer System," by Greg Nelson and David Redell, may be obtained from CPSR, P.O. Box 717, Palo Alto, CA 94301. Please include \$1 for postage and handling. ■

TEAR AND COMPARE! TEAR AND COMPARE! TEAR AND COMPARE! TEAR AND COMPARE!

WE WILL BEAT ANY PRICE BY \$10

See Other Side for Details

NEW! Expanded Special Order Dept.

We know there are many products that simply cannot be found through mail order. We've solved that problem...just ask for our SPECIAL ORDER department...We've got the suppliers ...still at low mail order prices!

FREE

Overnight Delivery
See Other Side for Details

PC JUNIOR CORNER

SOFTWARE

Lotus 1-2-3 (while they last)	\$309
Wordstar	149
Electric Desk	189
HARDWARE	
Captain 128K (Tecmar)	339
PC Mouse (Mouse Systems)	129

HARDWARE (Cont.)

Keytronic 5151 Keyboard	\$179
Keytronic 5149 Num. Keypad	\$0
Jr. 128K Booster (Microport)	145
Quadram Expansion Chassis	519
Quadram Exp. Memory	235
Quadram Jr.	219

NEW PRODUCTS ADDED DAILY...CALL!

PROGRAMMER'S DEPT.

Concurrent PC DOS (w/hardware)

Pascal MT + (PC DOS)	\$99
PL/1 - (DR)	489
Display Manager - (DR)	359
Access Manager - (DR)	269
LATTICE C COMPILER	305
C-Feed Smorgasbord	119

Pascal Compiler (MS)

C Compiler (MS)	\$245
C Compiler (MS)	305
Microsoft Sort	159
Cobol Compiler (MS)	479
Business Basic (MS)	229
FORTRAN COMPILER (MS)	299
C&C Compiler	345
(Computer Innovations)	

GENERAL HARDWARE

PRINTERS*

DIABLO	
36**	\$1229
025**	819
630-EC5**	1799
EPSON	
LQ1500	\$1199
Parallel Interface	79
JX-80**	599
LX-80**	265
LX-80 Tractor/Feeder	30
RX-100	359
FX-80 Plus**	379
FX-185 (New)**	669
JIUKI	
6100	\$439
6300	799
MANNESMANN TALLY	
Sprint 80	\$279
160	679
180	849
NEC	
2030**	\$719
2050**	895
3530	1329
3550	1395
8850**	1949
Pinwriter P2**	875
Pinwriter P3**	895
OKKATA	
182P	\$239
84-IBM	799
192 IBM	409
193P	559
2410P	2295
OLME	
Sprint 11/40**	\$1299
Sprint 11/55**	1595
Sprint 11/90**	2199
SILVER REED	
400	\$279
770	785
TOSHIBA	
P351 Tractor	\$165
P351	1375
1340	639
CITIZEN	
MSP10	\$315
MSP15	455
MSP20	455
MSP25	595

MONITORS*

AMDEK	
Color 300	\$255
Color 500	389
Color 600	479
Color 710	578
12" Green 300G	135
12" Amber 300A	145
12" Amber 310A	189
PRINCETON GRAPHICS	
RG8 HX-12	\$489
RG8 SR-12	585
Scan Doubler Board (for SR 12)	185
Amber Max-12E	185
QUADRAM	
Quadchrome 12"	\$465
Quadscreen 17"	1595
Quadchrome II 14"	465
Amberchrome 12"	165
TAXAN	
100G	\$125
105A	135
121	149
122	149
210	259
420	409
440	699

MULTI-FUNCTION BOARDS

AST RESEARCH	
Six Pak Plus (64k)	\$249
Mega Plus II (64k)	276
Mega Pak (256k)	369
Advantage (128k)	429
I/O PlusII	139
ONCHIO	
Blossom (0 k)	\$235
QUADRAM	
Quadboard (64k)	\$245
STB	
Super Rio (64k)	\$329
Rio Plus II (64k)	269
Rio Grande	375
Grande Byte	276
Chaffleur	Lowest Price
TECMAR	
Captain	\$199

COMMUNICATIONS BOARDS

AST	
AST-5251-11	\$699
AST-SNA	699
AST-BSC	699

COMMUNICATIONS BOARDS (cont.)

AST-3780	749
ACA	
IMA Board	\$949
QUADRAM	
Quadlink	\$449

GRAPHICS BOARDS

AST	
Monograph plus	\$425
Preview	279
EVGENEX	
Graphics Edge	\$309
The Edge	299
HERCULES	
Graphics Card	\$299
Color Card	169
MA SYSTEMS	
Peacock Color Board	\$245
PARADISE SYSTEMS	
Multi-Display Card	\$215
Modular Graphics Card	289
Options A & B	Lowest Price
QUADRAM	
Quadcolor I	\$195
Quadcolor II	465
SIGMA	
Color 400	\$649
STB	
Graphics Plus II	\$315
TECMAR	
Graphics Master	\$459
TSENG LABORATORIES	
Ultra Pak	\$845

MODEMS

HAYES	
Smartmodem 300	\$205
Smartmodem 1200	445
Smartmodem 1200B w/hardware	349
Smartmodem 2400	719
NOVATION	
Access 1-2-3	\$475
Smart Cat Plus (Int.)	355
Professional 2400	689
PRENTICE	
Popcom X100	\$379
Popcom C100	359
PROMETHEUS	
Pro modem 1200	\$376
Pro Modem 1200B	319

MODEMS (cont.)

QUADRAM	
Asher	\$395
Quadmodem 2000	315
Quadmodem 2024	499
Quadmodem 2100	375
Quadmodem 2124	565
RACAL-VADIC	
Maxwell 1200 PC (w/sw)	\$239
Maxwell 1200 V (w/sw)	239
2400 V	435
VEN TEL	
PC Modem Half Card	\$379
PC Modem 1200	399
1200 Plus	399

BACK-UP DEVICES

ALLOY	
PC Quick Tape (60Mb)	\$1719
SYSGEN	
Image (10Mb)	\$835

MOUSE INPUT DEVICES

MOUSE SYSTEMS	
PC Mouse w/paintbrush	\$139
MICROSOFT	
Microsoft Mouse (Serial)	\$140
Microsoft Mouse (Buss)	139

SURGE PROTECTORS

KENSHING MICROWARE	
Master Piece	\$115
CURTIS	
Diamond	\$39
Emerald	49
Sapphire	59
Ruby	69

KEYBOARDS

KEYTRONIC	
5150	\$159
5151 (Deluxe)	175
5152B	645

MEMORY CHIPS

64k (200ns)	\$35
256k (150ns)	69

DISKETTES

LOGICTRAK 5 1/4"-100% GUARANTEED	
Double side, double density, 10 per box	
20 + boxes	per disk \$2.35
10-19 boxes	per disk \$2.50
2-9 boxes	per disk \$2.99
1 box	per disk \$3.99

*Due to weight restrictions, Printers and Monitors are shipped UPS...FREE

**Parallel interface req...Ask sales agent

NE SHIP/CARRY for VISA or MasterCard • No Sales Tax on Orders outside N.Y. State • Purchase Orders Noted from Qualified Institutions and Organizations • Please call for price verification • Please add 4% for handling and insurance (all orders add 1) • Payment: MasterCard, VISA, American Exp. C.O.D. Money Order or Check

National Sales
Hot Line

1-800-645-3491

Customer Service 1-800-431-9037

New York State...516-249-6440

Canada...416-283-2354

Domestic/International Telex...286905 Soft UR

THE LOGICAL CHOICE

A Member of The Logic Group

110 Br-County Blvd., Farmingdale, N.Y. 11735



TEAR AND COMPARE! TEAR AND COMPARE! TEAR AND COMPARE! TEAR AND COMPARE! TEAR AND COMPARE!

**LOGICSOFT INCREDIBLE
NEW SERVICE BREAKTHROUGH**

FREE OVERNIGHT DELIVERY!

On Orders Totalling
over \$100... Shipped
UPS FREE #
Under \$100
(within Continental
U.S.)

VIA...  **Purulator
courier**

**PLUS...IF YOU CAN FIND A LOWER PRICE
We'll Beat \$10
It By...**

THAT'S RIGHT! OUR LOWEST PRICE GUARANTEE IS STILL EFFECTIVE!
Tell us the advertiser and price of any software or hardware item on these pages cur-
rently advertised in any popular computer publication and we'll beat that price by
\$10. This offer does not apply to items under \$100 or where the price is not lower
than Logicsoft's. NO DEALER'S PLEASE!

SOFTWARE for IBM PC

WORD PROCESSING	
Wordstar 2000	\$250
WORDSTAR 2000 PLUS	305
Wordstar Pro Pac	265
Wordstar Pro Plus	345
WORD PERFECT (New Release)	225
Microsoft Word	235
Spellbind	Lowest Price
MULTIMATE	240
Volkswriter Deluxe	155
Peachtext 5000	199
Easywriter II/Spellr/Mailer	195
Edix & Wordix	255
Finalword	225
Samra III	325
Xy Write II Plus	295
Think Tank	125
pfs: WRITE	85
Wordplus PC with Boss	339

DATA BASE MANAGEMENT	
KNOWLEDGEMAN	\$250
Cornerstone	Lowest Price
Tim IV	189
R-Base 4000	255
R-BASE 5000	385
DB Master	475
d Base II (New Release)	299
Condor III	340

DATA BASE MANAGEMENT (cont.)	
d BASE III	\$369
Clipper (d Base III Compiler)	390
Data Base Manager II (alpha)	175
Infostar plus	150
Friday	199
pfs: file & pfs: report	185
REVELATION	745
Powerbase	255
Personal Pearl	225
Easyliner	235
Superfile	159
Guru	1895

INTEGRATED/SPREADSHEETS	
LOTUS 1-2-3 (v2.0)	\$305
Enable (New Version)	399
Smart Series	579
Ability	330
FRAMEWORK	359
Open Access	395
Electric Desk	225
SYMPHONY (Limited Quantity)	425
Supercalc 3	170
Multiphan	120
TKI Solver	279
pfs: plan	95
FINANCIAL	
DOLLARS AND SENSE	\$115

FINANCIAL (cont.)	
Financier II	115
MANAGING YOUR MONEY	\$119
Home Accountant Plus	99
Howard Tax Preparer	185
Professional Tax Planner	319
Fixed Asset System (BEST)	430
Market Manager Plus (Dow Jones)	170
Market Analyzer (Dow Jones)	289

GRAPHICS	
CHARTMASTER	\$275
Signmaster	195
BPS Graphics	200
Fast Graphs	285
pfs: graph	85
GRAPHWRITER	319
Graphwriter Combo Pak	485
DIAGRAM MASTER	185
Microsoft Chart	175
ENERGRAPHICS	259
Energraphics with plotter option	325
PC Draw	295
Gem Draw (Incl. Desk Top)	95

PROJECT SCHEDULERS	
MICROSOFT PROJECT	\$185
SuperProject (IUS)	245
HARVARD TOTAL PROJECT MGR.	265
Project Scheduler (Scitor)	245
Project Scheduler 5000 (Scitor)	279

SOFTWARE UTILITIES for IBM PC

WORD PROCESSING	
FANCY FONT	\$150
Wordplus (Gasis)	115
pfs: proof	95
Punctuation & Style	99
Spellix	50
Wordperfect Sorter	70

DATA BASE	
Quickcode III	\$159
d Graph III	175
d Util III	85
k Graph	175
k Paint	85
k Text	100

DATA BASE (cont.)	
Gout 2	\$145
Extended Report Writer	110
Sideways	45
GENERAL	
PROKEY 4.0	\$80
Norton Utilities (New Release)	95
SIDEJOCK (unpublished)	95

Prices & policies subject to change without notice.

Immediate Replacement on any Defective Product.

• NO SURCHARGE for VISA • MasterCard • No Sales Tax on Orders Outside N.Y. State • Purchase Orders
Welcome from Qualified Institutions • NO SURCHARGE (Please call for price verification) • Please add 5%
for handling and insurance (all orders add 1) • Payment: MasterCard, VISA, American Express, C.O.D. Money Order or Check

National Sales
Hot Line

1-800-645-3491

Customer Service 1-800-431-9037

New York State...516-249-8440

Canada...416-283-2354

Domestic/International Telex...286905 Soft UR

LOGICSOFT

THE LOGICAL CHOICE
A Member of The Logic Group

110 Bi-County Blvd., Farmingdale, N.Y. 11735



SEE OTHER SIDE
FOR MORE SAVINGS!

YOU FORCED US TO MOVE!

...and We Love You For It!



Because of the tremendous response you've given to our **FREE OVERNIGHT DELIVERY** and **'10 OFF** policies, our growth has been phenomenal! Even we did not project how rapidly we would expand. Quite honestly there were times when it seemed like the whole country was trying to place an order...at the same time!

We realize that some of you have had problems getting through (our phones simply could not handle the volume) and, yes, some have even gotten their shipments late (our shipping department has been on a 12 hour schedule)...to those of you, we **APOLOGIZE** for the inconvenience and would like to say **THANK YOU** for your patience.

A one million dollar investment has allowed us to solve these problems...we've just moved into our new World Headquarters, beated up our sales department, added a spanking new phone system and built a fully automated warehouse.

Oh, sorry, we almost forgot "Herold" (who's extremely fast, but very sensitive) our new 100 terminal computer system. He's designed to speed up order processing to get your shipments out the door...fast. Sorry Herold.

INTERNATIONAL ORDERS

EUROPE Announcing Logicsoft Europe!

Our European friends may now order directly through our Amsterdam Distribution Center, which carries the latest factory fresh versions of the most sought after IBM PC software and hardware. Now you can receive your order fast and still take advantage of the incredible savings that only mail order can offer. Please call or telex to confirm pricing & policies. Telex 10759 Logic NL.

Call 020-834884 or mail orders to:
LOGICSOFT EUROPE BV
25 1465, 1006 AL
AMSTERDAM, HOLLAND

CANADA

For our Canadian customers we've installed a special local number, 416-283-2354. Now you can get the big dollar savings in mail-order for the cost of a local call. Or, if you wish, Telex 289905 Soft UR.

FAR EAST AND AUSTRALIA

Call 516-249-6440 and ask for our International Department. They're experts on export and you get to take advantage of our great mail order prices. Telex 289905 Soft UR. Please call or telex to confirm pricing & policies.

WE WILL BEAT
ANY PRICE BY

\$10

See Our Card for Details

FREE

Overnight Delivery

See Our Card for Details

**EVERYTHING YOU ALWAYS
WANTED TO KNOW ABOUT
BEATING A PRICE BUT WERE
AFRAID TO ASK...**

or How I Learned To Save Money
Without Really Trying.

We know there are still a few of you who have shied away from ordering from us (you know who you are) perhaps thinking our \$10.00 off and FREE overnight policies were a "gimmick" or a "come-on" to pressure you into something.

We'd like to tell you how simple it really is. Just pick up the phone and dial 1-800-645-3491, then tell your sales agent you'd like to beat a price (don't be embarrassed; he's not), the name and date of the publication and who you want us to beat. No gimmick, no come-on, it's that easy.

CONFUSED OVER ACCOUNTING SYSTEMS?



We don't blame you, that's

why we invite you to give us a call. We've evaluated over 50 of them and just because you can save a lot of money buying mail order shouldn't mean you have to sacrifice service...We want to take the time to assist you before you buy. We realize that an accounting system can add up to a sizeable investment and helping you end up with the right package for your money is what doing business is all about.

ACCOUNTING SYSTEMS

	Information Unlimited (IUS)	Open Systems	Great Plans	Peachtree Series 4	State of The Art	Realworld (MBS)	BPI
Accounts Payable	*299	*409	*499	*369	*479	*575	*395
Accounts Receivable	*299	*409	*499	*369	*479	*575	*395
Fixed Assets	---	*409	---	*369	---	---	---
General Ledger	*299	*409	*499	*369	*479	*575	*395
Inventory	*299	*409	*499	*369	*479	*575	*539
Job Costing	---	*409	*499	*369	---	---	*539
Material Management	---	*409	---	---	---	---	---
Order Entry/Process mg	*299	*409	---	*369	*479	*575	---
Payroll	*365	*409	*499	*369	*479	*575	*395
Report Writer	---	*409	---	---	---	---	---
Sales Invoicing	---	---	---	*369	*479	---	---
Purchase Order Entry	---	*409	---	---	---	---	---

TCS Client Ledger System

*1195

JUST A PARTIAL LISTING OF ACCOUNTING SYSTEMS - CALL TODAY!

CIRCLE 282 ON READER SERVICE CARD

LOGICSOFT®

THE LOGICAL CHOICE

A Member of the Logic Group



110 Bi-Country Blvd., Farmingdale, N.Y. 11735

1-800-645-3491

In New York State...516-249-8440 • In Canada...416-283-2354

Customer Service 1-800-431-9037

See following pages for Software, Hardware, Special Order Dept., Programmers Dept., PC Jr. Corner and our Computer Forms Division.

Can Computers Be Fail-Safe?

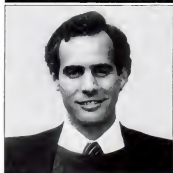
The hardware and software bugs that plague even the simplest computer systems make Star Wars and other grandiose Pentagon plans for computerizing war seem terrifying.

The Department of Defense, whose favorite pastime is throwing good money after bad, has devised another idiotic scheme to save us from the Communists. You've probably all heard of it by now: It's known as the Strategic Defense Initiative, aka the Star Wars defense system, and it calls for the design and construction of a vast network of computers, satellites, laser beams, antiballistic missiles, and other ridiculously expensive and unreliable electronic gadgets to protect us from a Soviet nuclear strike. It's one of the stupidest ideas the Pentagon ever had.

Star Wars, which the Pentagon estimates will set us back about \$26 billion (but you can bet that it will end up costing much more; you know how expensive those custom-made toilet seats can be), is only one of several heavily computerized weapons systems that the military is pushing. For example, the Army is seeking to develop an "autonomous land vehicle," an unmanned tank that could fire weapons and conduct reconnaissance without human guidance; the Air Force is hoping to devise a "pilot's associate," a computerized copilot that would help fliers operate their electronic weapons and engage in deadlier dogfights; and the Navy is working on artificial intelligence systems for its warships, which, as the sinking of the British destroyer *Sheffield* in the Falklands war demonstrated, have become sitting ducks for any smart bomb or guided missile.

At the heart of all these projects is a major military research-and-development campaign known as the Strategic Computing Program (SCP). A 5-year, \$600-million effort, it began in 1984 with an initial budget of \$50 million. The SCP wants to

develop a new generation of intelligent weapons, such as the Army's autonomous vehicle, that could fight a battle, perhaps even an entire war, with little or no human intervention. The SCP is run by the Defense Advanced Research Projects Agen-



Stan Augarten

cy (DARPA), sort of a military venture capital firm that finances state-of-the-art research-and-development projects. DARPA's armchair warriors have outlined their absurd ambitions for the SCP in a report entitled *Strategic Computing, New-Generation Computing Technology: A Strategic Plan for Its Development and Application to Critical Problems in Defense*. DARPA may be the death of us all:

Instead of fielding simple guided missiles or remotely piloted vehicles, we might launch completely autonomous land, sea, and air vehicles capable of complex, far-ranging reconnaissance and attack missions. . . . In contrast with previous computers, the new generation will ex-

hibit humanlike, "intelligent" capabilities for planning and reasoning. . . . Using this new technology, machines will perform complex tasks with little human intervention, or even with complete autonomy. . . . Our leaders will employ intelligent computers as active assistants in the management of complex enterprises.

Developing all this hardware isn't going to be easy, but writing the software will be much harder, perhaps impossible. The SCP is planning to create the largest programs ever conceived; the Star Wars network alone will require about 10 million lines of computer code, while such lesser projects as the autonomous vehicle will need several million each. Not only will these programs dwarf the biggest programs in existence today, but they will have to transcend the rigid logic of current programming and achieve a plastic versatility akin to human thought.

Not known for its pessimism, the SCP hopes to achieve all this by the early 1990s. Of course, the necessary software technology doesn't exist and won't for decades, if ever; today's computer scientists can't even get a wheeled robot to roll into a room and pick out a copy of *War and Peace* from a pile of comic books, let alone tell the difference between friend or foe. Anyone working in that pie-in-the-sky business called artificial intelligence knows how far down the road such abilities really are, but the military, afflicted by an incredibly bad case of technological hubris, thinks anything is possible. The Pentagon is quite literally banking on major technological breakthroughs appearing on schedule (for another view of artificial intelligence, see "Is There Intelligent Life in

We've gone to great widths to make you look good.



Introducing New SIDEWAYS™ Version 3.

Sideways has always been the favorite way to print nearly everything that's too wide for a printer. Not surprising.

It's quick. It's easy. And it makes clean, one-piece printouts as wide as you like. So you get spreadsheets that really spread out. Pert charts that peer far into the future. All kinds of extra-wide reports without staples, glue or tape.

But now Sideways Version 3 goes even further.

Especially for 1-2-3™ and Symphony®

Now you can make short work of those wide 1-2-3 spreadsheets. No need to make print files. Just highlight a range and print right from your worksheet file using familiar Lotus-like menus.

Mix bold, underlined and expanded type, all on the same page. Print through or skip over perforations. Make the finest extra-wide printouts this side of typesetting.

Using Symphony? Sideways chimes right in to print any worksheet you've loaded without ever leaving your Symphony session.

No matter what software you use.

Spreadsheets, databases, word processors, project planners. Whatever you use, you'll get more out of new Sideways.

Choose from nine different type sizes, from "minuscule" to "mammoth." Print bold, underlined or expanded - whatever your software can create. Even foreign language and line-drawing characters. Plus, there are so many ways to adjust margins, spacing and page size, it stretches the imagination.

Sideways Version 3 for the IBM® PC and all popular dot-matrix printers. Available now at computer dealers nationwide. Or directly from Funk Software with your check, Visa or Mastercard.

At just \$69.95 a copy, you'll never want for width again.

Special upgrade offer!

Just send \$20 along with your current Sideways program disk and manual directly to Funk Software. We'll send you Version 3 right away.



Funk Software, 222 Third Street, Cambridge, MA 02142. Phone (617) 497-6339.

Copyright 1985, Funk Software, Inc. Sideways is a trademark of Funk Software. Lotus, 1-2-3 and Symphony are registered trademarks of Lotus Development Corp.

CIRCLE 317 ON READER SERVICE CARD

TAXAN 600 SERIES

Industry Standards Upgraded!

The Models 630 And 640 Are 100% Compatible With The AT&T 6300 and 6300 Plus!

A perfect upgrade/replace-ment for the standard IBM color graphics monitor and card, the Taxan model 630 and 555 create a higher resolution at a greater savings!

	
IBM Display	TAXAN 630
IBM CGA	TAXAN 555
Color Adaptor	SG Board
\$924.00	\$920.00
PRICE/PERFORMANCE RATIO	

630 Super High Resolution Text and Graphics.

Superior Text and Graphics Beyond IBM.

640(H) x 200(V) Resolution
(640(H) x 400(V) Non-Interlaced Resolution

0.37mm Dot Pitch
24.75Khz Scan Frequency
100% compatible with IBM PC, XT, and AT* when used with the Taxan 555 board.
\$675.00 Suggested Retail



Compatible with AT&T 6300 Computer

RGB Color, and FOUR Monochrome Capabilities in One Monitor!



RGB



REVERSE BLUE



REVERSE B & W



AMBER



GREEN

No one else offers the monochrome options available with the new Taxan 600 series!

The Taxan 630 & 640 monitors offer Green, Amber, B&W Reverse, and a White on Blue Background as their total spectrum of monochrome options.

Only Taxan offers such a wide variety of monochrome capabilities.

Total CAD/CAM Compatibility 720 x 400 Resolution!

640

The Taxan 640 The Ultimate in Monitor Resolution.

640(H) x 400(V) Non-Interlaced Resolution
4,000 Character Display Capability
0.31mm Dot Pitch
24.75Khz Scan Frequency



Compatible with AT&T 6300 Computer

100% Compatible with the new generation of graphics boards Taxan (555), Persyst B.O.B.®, Sigma 400®.

Artist IP®, STB 400® and others for the IBM PC, XT, and AT.
\$775.00 Suggested Retail

Screen Test—This actual unretouched photograph demonstrates the superior text resolution created by the TAXAN 630 monitor and 555 color card! For maximum resolution and ease of viewing, Taxan's the winner!

555 The Taxan 555 is basically equivalent to the IBM standard color board. This means that the 555 is 100% compatible with all IBM software!

COMPATIBILITY	IBM	TAXAN
Test Mode	16 Colors	16 Colors
320 X 200	4 Colors	4 Colors
640 X 200	1 Color	1 Color
Alphanumeric Text Resolution		
Character Cell	8 X 8	10 X 16
Scan Frequency	15.75 KHz	24.75 KHz

© 1985 Taxan Corporation

TAXAN

TAXAN CORPORATION
18005 CORTNEY CT.
INDUSTRY, CA 91748 (818) 810-1291

TAXAN EAST, MIDDLESEX BUSINESS CTR.
111 CORPORATE BLVD. SUITE E
S. PLAINFIELD, NJ 07080 (201) 769-6500

*IBM, IBM PC, XT and AT are registered trademarks of International Business Machines Corp. *SIGMA 400 is a registered trademark of Sigma Designs. *ARTIST is a registered trademark of Control Systems. *STB 400 is a registered trademark of STB Systems, Inc. *IBO B and 6300 Plus are registered trademarks of AT&T Information Systems, Inc.

CIRCLE 699 ON READER SERVICE CARD

Princeton Graphic Systems Number One Again

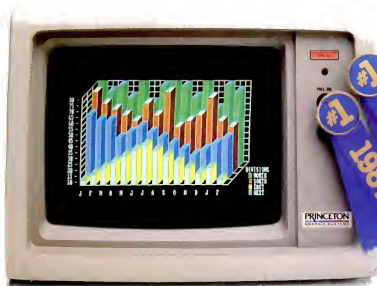
Sharp resolution, full compatibility, and rugged reliability. That's what you get in every Princeton Graphic Systems monitor. That's why Princeton Graphic Systems is number one in the minds of more and more personal computer owners every year.

Only Princeton Graphic Systems offers a complete family of quality personal computer

displays. Our color and monochrome monitors outperform the competition every time. That's why, for the second year in a row, our HX-12 high resolution color monitor has been voted best in the world.*

So for the very best in personal computer monitors, pick the company that's number one. Princeton Graphic Systems.

*PC WORLD Magazine's 1985 World Class Survey



PRINCETON®

GRAPHIC SYSTEMS
AN INTELLIGENT SYSTEMS COMPANY

601 Ewing Street, Bldg. A, Princeton, NJ 08540, (609) 583-1680, Telex: 821402 PQSPRIN, (800) 221-1490 Ext. 702

CIRCLE 199 ON READER SERVICE CARD

Unlike almost all other PC graphics packages, it doesn't start with the same old "let's draw a bar/line/pie chart" limitation.

Freelance has a lot of CAD-like fea-

tures; in fact, *AutoCAD* users are going to feel right at home grid-snapping around in *Freelance*. The program comes with a large and genuinely useful library of stored symbols—no cute little images of smiling

airplanes or talking coffee cups—and you can easily construct, scale, and store your own additions to that library. By breaking the old paradigms about what PC graphics programs ought to do, and how, *Freelance* instantly became the most interesting graphics program on the market.

But it's still not the optimum product for business graphics users because its very unstructuredness forfeits the advantages of a fat chartbook full of predefined chart formats. Yes, it's happy to let you design and store your own chartbook; and yes, it works well with graphs produced by the same vendor's *Graphwriter* chartbook.

By breaking the old paradigms about what PC graphics programs ought to do, and how, *Freelance* instantly became the most interesting graphics program on the market.

But that puts you back into the "start from scratch" or "patch up another program's output" grooves.

Graphics software vendors are at least as interested in *Freelance* as are those of us who're using the package. It's like the early days of 1-2-3: Other vendors keep asking me, "Is it really that much better?" "Does the difference really matter?" "Do people really want that kind of stuff?" Yes, yes, and yes.

A Combined System

Some of those shops will no doubt rush to market clever knockoffs. But others are already looking at ways of combining *Freelance*'s lack of structure with a fat, *TELL-A-GRAF*-like chartbook. We can look forward to seeing those packages on the market in 1986.

Then PC graphics can join spreadsheet and word processing packages as applications that actually work better on personal computers than on the Big Iron. And I'll be able to produce good-looking overheads that clients can read without binoculars. Or apologies. ■



dBASE-III POWER TOOLS

FOX & GELLER

QUICKREPORT™ dBASE Report Writer

A full featured report writer for any job—simple or complex:

- Connect up to 6 databases per report
- No programming required
- Draw reports on screen
- 16 levels of sorting
- 16 levels of totalling
- Use bold, underlining
- Print forms
- Date, arithmetic
- Up to 255 columns wide

**POWERFUL,
YET
SIMPLE**

Now you can create database applications in minutes without programming.

- Generate dBASE programs automatically
- Programs are commented and bug-free
- Data Entry Programs/Forms
- Data validation programs
- Computed fields
- Multi-page forms
- Menu Generator

QUICKCODE-III dBASE-III Program Generator

Also Available:

dGRAPH-III—Quality graphics for dBASE-III

dUTIL-III—Programming utility for dBASE-III

NEW QUICKINDEX—Index Files up to 90% faster than dBASE

Available from your local dealer.

(201) 794-8883

FOX & GELLER
604 MARKET ST.
ELMWOOD PARK,
NEW JERSEY 07407



dBASE™ Ashton-Tate Quickreport and QuickCode™ of Fox & Geller

CIRCLE 206 ON READER SERVICE CARD

Publish the Most Important Book You'll Ever Own.

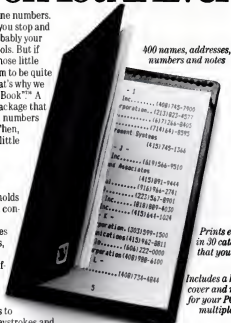
Names. Addresses. Phone numbers. All those little notes... If you stop and think about it, they're probably your most valuable business tools. But if you're like most people, those little pieces of paper never seem to be quite where you need them. That's why we created "The Little Black Book™". A practical little software package that takes all those names and numbers and puts them out quick. In little black book size.

400 Entries. 30 Categories.

The Little Black Book holds up to 400 of your personal contacts. Create 30 different index categories (like sales offices, friends, customers, etc.). Call them whatever you want. Put up to 400 different entries in each index. Even all entries in multiple indexes. When you're finished, just tell us to print. A couple of quick keystrokes and bingo, out of your printer comes your little black book. On standard printer paper. Just cut along the dotted lines, staple together, and slip it into the leatherette cover that comes with the package. If you change a few numbers, or add a few addresses, print it again. The whole process only takes minutes.

Pops in. Pops out. Even dials.

If all The Little Black Book does is print, it'd be a great value. But there's more. You're preparing a spreadsheet and you need to look up a phone number. Hit two keys and up pops your most frequently used entries. Tap the two-digit index code, and there's the number. If you have a Hayes compatible modem, it's dialed automatically. Including access numbers for lower cost services like SPRINT. No Modem? Buy the Cygnet Accessory Dialer Board for only \$69.95. Now you're ready to use the advanced "Screen Dialer" that actually finds numbers in other programs (like databases, word processors etc.) and dials automatically. Right off the PC's screen.



*Prints entries
in 30 categories
that you create*

*Includes a handsome
cover and materials
for your PC to make
multiple books*

Bells. Whistles. And a Guarantee.

Already have your contacts stored in another program? No problem. Use the optional file converter to enter them into The Little Black Book automatically. Labels from your addresses? Definitely. The optional Label Maker sorts and prints labels, rolodex cards, envelopes, you name it. We even make a printing calculator that takes columns of numbers from other programs and calculates them automatically.

Use your Little Black Book to keep track of sales prospects; to print different books for the office, the home and the road. You can even buy one program and print books for everyone in your company (5 extra covers are only \$24.95).

There are thousands of reasons to buy The Little Black Book, but maybe one more might help. Try this. If for any reason you don't like the program, simply return it within 30 days. We'll return your money. No questions asked.

Call today: **1-800-621-4292**
1-800-331-9113 (in California)

The Little Black Book™



CYGNET®

Handy Software for Busy People



Charge By Phone or Send In The Coupon Today.

- ☐ The Little Black Book \$49.95
- ☐ The Little Black Book (not copy protected) \$69.95
- ☐ Pack of 5 extra covers for multiple books \$24.95
- ☐ Optional Accessory Dialer Board \$69.95
- ☐ NEW! LBB Printing Calculator + \$19.95
- ☐ Optional LBB Label Maker \$29.95
- ☐ Optional LBB File Converter \$19.95

Name _____
Address _____
City _____ State _____ Zip _____
Phone _____
Outside US and CAN for shipping and handling. Sorry, but no C.O.D.'s or P.O.s.

To: Cygnet Technologies, Inc., Dept. LBB
1236 Lawrence Station Road
Sunnyvale, CA 94089

Call Now: **1-800-621-4292**
(In California) 1-800-331-9113

Card Number _____

Absolutely No Questions Asked 30-DAY MONEY BACK GUARANTEE

PC PERSPECTIVES

then call up *GraFIX Partner* to make the whole thing presentable.

The dedicated graphics packages on the market go part of the way toward moving PC graphics into the serious-graphics

league. *Microsoft Chart*, *SIGN-MASTER* and *CHART-MASTER*, and *Graphwriter* are my favorites. *Chart* and the *MASTERS* duo have recently added a very nice (but slow to plot) bold Helvetica typeface that

makes relatively readable headlines. *Graphwriter* still uses stick lettering but has a very good, diverse, and easy-to-use chartbook approach, which users (including me) like very much.

However, although these packages are much better than the graphics programs generally tacked on to 1-2-3, they're well short of what we need if we're going to produce no-apologies graphics.

A Chartbook System

At minimum, we need the following features: an easy-to-use, comprehensive chartbook system; a wide variety of type-


It's goofy to have to put numbers into a 1-2-3 worksheet, then draw a graph from those numbers, then call up a Lotus repair kit like *GraFIX Partner* to make the whole thing presentable.

faces in a very wide variety of sizes; fast and easy snatching of data sets from other programs (mainly, 1-2-3); easy transition from binary input to two-dimensional screen and plotter output; and large on-line libraries of stored symbols. We'd also like an easy means of creating, storing, and updating the numbers in templates of our own design, saved in our own personalized chartbooks—something like the personalized word lists we can add to the built-in dictionaries of many spelling checkers. Every serious PC graphics user will have his or her own additions to this list.

Graphic Communications, publishers of *Graphwriter*, recently shipped *Freelance*, a new kind of PC graphics program that is a harbinger of what's coming in the next year or so.

Unstructured Graphics

As opposed to the highly structured approach that most business graphics programs take, *Freelance* is highly unstructured. It uses a vaguely MacPaintish approach to designing graphics on-screen.



1-2-3®

POWER TOOLS

FOX & GELLER
from the Enhancement Specialist

MAKE 1-2-3 EASY!

WITH QUICKCODE™ FOR 1-2-3

You get all these features and more:


- Learn Mode**—Turn keystrokes into time-saving macros in seconds...without programming.
- Macro Library**—Save all your favorite macros (with full English names) in a library...then run them with any worksheet!
- Data Entry Forms**—Now anyone in your office can use 1-2-3. Create data entry forms in your worksheet automatically in minutes, including friendly menus to guide you along. QUICKCODE automatically writes complete, runnable programs in 1-2-3's new Macro Language. All you do is run them and enter your data.
- Debugger**—Debug any macro interactively in record time—using traces and breakpoints that go beyond 1-2-3's Single Step mode.
- PL/123—The Friendly Language**—Turned off by macro programming? Use our friendly BASIC-like language, PL/123. It runs inside 1-2-3 and includes a pop-up text editor, Menu Builder, Program LINKer, and lots more. Write your programs using DO WHILE, IF/THEN ELSE, CASE, program variables, comments, etc.

You could be using QUICKCODE right now.
What are you waiting for?

Available from your local dealer

(201) 794-8883

FOX & GELLER
604 MARKET STREET
ELMWOOD PARK,
NEW JERSEY 07407



FOX & GELLER

1-2-3 is a registered trademark of Lotus Development Corp. QUICKCODE is a trademark of Fox & Geller.

CIRCLE 247 ON READER SERVICE CARD

Graphics with No Apologies

Combining a superb library of symbols with a highly unstructured approach, *Freelance* is a harbinger of graphics programs to come. But will its lack of predefined chart formats handicap its use?

PC graphics programs are the fourth- or fifth-most-popular category of PC applications programs, depending on which market researchers' pie charts you believe.

PC graphics are a hit in a lot of businesses. They've been useful tools for a lot of boardroom warriors, who have been able to keep their captive audiences awake a little further into presentations, thanks to Lotus overheads. And they've helped Hewlett-Packard sell an awful lot of nice little plotters.

But look, it's time for some straight talk among friends. Most PC graphics aren't really very good, are they? 1-2-3 graphs did more to get the PC graphics boom rolling than all the *GraFIX Partners*, *CHART-MASTERS*, and *Graphwriters* put together. And Lotus deserves our thanks for sensitizing hundreds of thousands of personal computer users to the possibilities of communicating information and trends visually, rather than through numbing rows and columns of seemingly meaningless numbers.

But those same Lotus graphs are a fine example of what's wrong with PC business graphics: Precisely because 1-2-3 has become so popular, it's become part of the problem.

1-2-3 Graphics

Take a look at the typical 1-2-3 graphic, plotted onto a piece of plastic and used as an overhead transparency. See that ugly stick lettering? Try reading headlines set in that skinny-limbed typeface when you're back about 10 or 20 feet from the screen. Even if you're right on top of the screen—or looking at a paper plot of that overhead

in a salesman's flip-book across your desk—notice the marginal aesthetics of the graph.

It isn't just the thin-stroke typefaces of graphs constructed with Lotus. It's the limited range of chart types, the difficulty



Jim Seymour

of floating little labels and pointers into the right place, and that overall "engineering-drawing" look of the finished product. Not to mention the time and effort involved in constructing those graphics a nibble at a time.

TELL-A-GRAF

Think I'm being hard on the good folks at Lotus? Take a look at some graphs produced by ISSCO's superb mainframe graphics package *TELL-A-GRAF*. Look at *TELL-A-GRAF*'s "chartbook"—a quick, civilized approach to laying out a graph that keeps those of us with less-than-professional design skills from creating a visual monster. Watch a reasonably experi-

enced *TELL-A-GRAF* user throw together a nice vertical bar chart complete with drop shadows, borders, a two- or three-line title, a data-source credit in the lower left-hand corner, and some labels for a couple of the bars.

And weep.

All thanks to mainframe magic and power? Nope. Thanks to good old-fashioned program design. And the kind of program evolution that shows a decent attention to what users want and to what does and doesn't work about the product. ISSCO programs once produced crummy graphics, too. But ISSCO noticed that skinny, illegible lettering, bars and columns with cross-hatching instead of solid-color fill, and other crude touches produced ugly, hard-to-decipher graphics. And the product got a whole lot better.

In all fairness, let's acknowledge that Lotus graphics are really magnificent for one purpose: quick analysis of what a set of numbers you're working with really means. Flip back and forth between the worksheet screen and the updated graphics screen and you'll get a much better understanding of all the various interrelationships between those numbers. The problem is with us, the users: We actually believe the 1-2-3 manual when it urges us to ship those dandy on-screen analytical images over to a printer or plotter for presentation to others.

I'll concede that you can do a lot of enhancement to Lotus graphics with the graphics fix-up programs. *GraFIX Partner*, the best of the Lotus repair kits, can produce nice results. But it's goofy to have to put numbers into a 1-2-3 worksheet, then draw a graph from those numbers,

THE IBM PC-ATTM ONLY HAS THREE STRIKES AGAINST IT.



PERFORMANCE.

With PCTurbo 186* your IBM PC or XT can run 200-400% faster. That's much faster than the AT. It's faster than any other accelerator board, too. And the optional 8MHz 8087-2 makes it faster still.

	Lotus 1,2,3*	Frame- work*	Auto- CAD*
IBM PC	243	90	85
PC AT	84	N.A.*	37
PCTurbo 186	82	43	35
PCTurbo 186/87	N.A.**	12	23

Benchmark tests. All times in seconds.

*Future version 1.1 of Framework will be AT compatible.

**Future release of Lotus will support 8087.

PRICE.

You get more than 100% of the performance for less than 15% of the price.

COMPATIBILITY.

The AT is only 70% compatible with the IBM PC. PCTurbo 186 is 100% compatible. So you can run *every* popular PC program.

You get more RAM, too. Up to 768K on-board, for a system total of up to 1.4 Mbytes. And PCTurbo 186 installs in one simple step. Call 415-490-8586 for your dealer's name. PCTurbo 186 puts AT performance in everyone's ballpark.



ORCHID

47701 Westinghouse Dr., Fremont, CA 94539
TEL: 708280

PCTurbo 186 is a trademark of Orchid Technology. IBM PC-AT is a trademark of International Business Machines, Inc. Lotus 1,2,3 is a trademark of Lotus Development Corp. Framework is a trademark of Ashton-Tate. AutoCAD is a trademark of Autodesk, Inc.

CIRCLE 492 ON READER SERVICE CARD

THE MOST POWERFUL, MOST
COMPLETE dBASE PROGRAM
DEVELOPMENT TOOL EVER!

FLASH CODE™

INTRODUCTORY
PRICE
\$150.

Program Developer
for **dBASE II & dBASE III**

Actually "DRAW" your dBASE screens!

Take full advantage of all special characters, draw boxes and lines, use the color select menu, move pieces of the screen around, and more!

Specify variable names, file variables, data types, acceptable data ranges, pictures for edit checking, initial values, calculated fields, indexes, and more in a flash!

FLASH Code writes your program in either dBASE II or dBASE III!

Use it as is, modify it, or merge it with your own code. You can even use our new FLASHUP module to instantly flash up even the most complicated screen designs. No more waiting for slow print statements to display your screens.



POP-UP Windows

Create pop-up menus and pop-up help screens with our window editor. Use the FLASHUP module and have them pop up all over your dBASE applications.

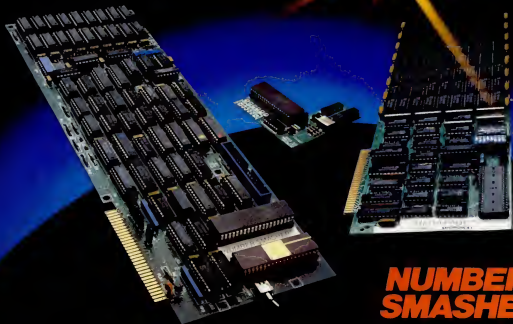
NO RISK DEMO OFFER! TRY IT—YOU'LL USE IT!

Here's a no-risk offer. Order now and you'll also get a full demo disk. Use the demo and the manual for 30 days. If you don't love it, return the package for a full refund!



THE
SOFTWARE
BOTTLING
COMPANY
OF NEW YORK

Credit card orders only call 24 hours a day, 1-800-824-7888, operator 268.
For all other orders and inquiries call or write: The Software Bottling Company of New York, 6600 L.I. Expwy, Maspeth, NY 11378,
(718) 458-3700. If we're shipping to a NYS address, please add 8 1/4% sales tax.



NUMBER SMASHER™

Triple your PC speed for only \$799!

8087 Upgrades™

MicroWay is the world leader in 8087 support. Our 8087 development software has been in use since 1982. By 1984 we had become Intel's 97th largest OEM account. When you buy from us, you can be confident that you will receive the 8087 chip designed for your PC and that our unique diagnostics will instantly verify that your processor works correctly as installed. Call for current prices.

287Turbo™

This card plugs into the 80287 socket on your AT or COMPAQ, doubling the 80287 clock from 4 to 8 Mhz. It does not change the 80286 clock speed or affect your warranty. The card comes with an 8 Mhz 80287 and has provisions for faster crystals as better 80287s become available. It also has a reset button and circuit that provide a hardware alternative to CNTRL-ALT-DEL. 287Turbo with Diagnostics and Reset **\$395**

Number Smasher™

Number Smasher gives you AT speed and 100% compatibility with all PC software and hardware. It comes with a 10 Mhz 8086 and 512K of no wait state RAM. Most are shipped with an optional matched 10 Mhz 8087 and 128K daughterboard. The card runs programs a factor of 2.5 to 4.0 faster than the PC, XT or compatibles it runs in. Other features include FASTROM, a Ram Disk, Print Spooler and Disk Cache. Revision 2 of the Smasher is designed and manufactured by MicroWay in the U.S.A. and has the best service and support of any accelerator card.

MegaPage™

MicroWay's "Lotus/Intel" extended memory card has all the features of the others plus one: it uses low power, cool running CMOS DRAM. Ask for our pamphlet "Extended vs Expanded Memory" and learn why MegaPage is the right card for you. MegaPage with 2 Megabytes CMOS **\$549**

MicroWay

The World Leader in 8087 Support

P.O. Box 79, Kingston, Mass. 02364 USA (617) 746-7341
Tompo House, London, U.K. call 01-223-7662

Number Smasher, MegaPage, and 287Turbo are trademarks of MicroWay, Inc. MicroWay is a registered trademark of MicroWay, Inc.

CIRCLE 159 ON READER SERVICE CARD

THE NORTON CHRONICLES

components of your computer are. That's probably a big reason why IBM has emphasized the use of diskettes as the backup medium for fixed hard disks.

Bernoulli Boxes address that issue very well. Like diskettes, they integrate the functions of live disk use and data backup (or lockup), and they offer unlimited off-line data capacity. The key, though, is to have a dual Bernoulli system; one drive alone doesn't cut it. A dual Bernoulli gives you easy backups, combined with 20 megabytes of on-line storage. It's the sensible choice for PCs.

The Doran Test

Part of the reason why I never favored Bernoullis is that I assumed that they were considerably slower than conventional hard disks. Boy was I wrong. Several people have pointed out to me the Bernoulli's hot performance, including Joe Doran, in-

Bernoulli Boxes integrate the functions of live disk use and data backup (or lockup), and they offer unlimited off-line data capacity. The key is to have a dual Bernoulli system.

ventor of what I call the Doran test for disk speed.

Joe's test is simple and pragmatic. You run CHKDSK to get the capacity of a disk; then you run my DT-DiskTest program and time how long it takes to read every byte off the disk. Divide capacity by reading time and you get a kilobytes-per-second performance measure. Experts may find it unsophisticated, but the Doran test is a practical performance test that anyone can run. Joe sent me the results of a bunch of tests he ran on a wide variety of disks, including Bernoulli Boxes. Sensibly, he scaled the results relative to a stock XT, rather than send them in an incomprehensible kilobytes-per-second format.

The XT's disk, by definition, rated 1.0. The AT's much faster disk rated 1.6 (60 percent faster than an XT), and the best Joe

found was an IDEAdisk at 1.8. In this context, look at the modest Bernoulli Box: It clocks in at 1.5, much faster than an XT and nearly up to an AT's disk speed. That's darned impressive for a type of disk

that most people—myself included—just assume has to be slow.

Bob Arnold and Joe Doran together have me convinced: The Bernoulli is great. ■

Create screens like this in minutes . . .



and Screen Sculptor writes the program!

In Basic and Turbo Pascal

It's that easy! The same Screen Sculptor package generates programs in IBM Basic, Turbo Pascal, and IBM Pascal.

Now, anyone can have attractive, intelligent input screens and sophisticated data entry routines in minutes.

Move pieces of the screen around, select colors from a menu, draw lines and boxes, point, repeat last character in any direction.



"GREAT PRODUCT! GREAT VALUE!"

Here's a second offer. Order now and you'll also get a full demo disk. Use the demo and the manual for 30 days. If you don't love it, return the package for a full refund!

All other orders and inquiries call or write: Software Bottling Co., 6500 L.I. Express, Maspeth, NY 11378. 718-456-3700.

And more!—Specify variable names, data types, acceptable data ranges, pictures for edit checking, etc.

Screen Sculptor then generates actual program source code based on your screen designs. Use it as is or modify it.

And it's only \$125

Requires an IBM PC, XT, PCjr, PC AT or 100%, compatible, 128K, DOS, one 320K disk drive and any 80 column display.

NO RISK DEMO OFFER!

Credit card orders call operator 268
(800) 824-7888



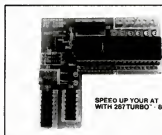
THE SOFTWARE
BOTTLING
COMPANY
OF NEW YORK

MICROWAY'S 8087 RUNS 1-2-3™!

MicroWay is the world's leading retailer of 8087s and high performance PC upgrades. We stock a complete selection of 8087s that run at 5 and 8 mhz. All of our coprocessors are shipped with a diagnostic disk and the best warranty in the business - one year! We also offer daughterboards for socketless computers such as the NEC PC and PCjr, and a board which increases the clock speed of the 80287 from 4 to 8 mhz. Our NUMBER SMASHER™ includes 512K ram. It will run the IBM PC at clock speeds up to 10mhz and achieves a throughput of .1 megaflops

with 87BASIC/INLINE, Intel Fortran, or Microsoft Fortran. Software reviewers consistently cite MicroWay software as the best in the industry! Our customers frequently write to thank us for recommending the correct software and hardware to meet their specific needs. They also thank us for our same day shipping! In addition to our own products which support the 8087 and 80287, we stock the largest supply of specialized software available anywhere. For information call us at

617-746-7341



SPEED UP YOUR AT
WITH 287 TURBO - 8 mhz

MicroWay® 8087 Support

For the IBM PC, PC XT, PC AT and Compatibles.

NUMBER SMASHER™ The World's Fastest Accelerator Card for the IBM PC, XT, and Compatibles! Includes an 8086 and 8087 pair tested to 10mhz, and 512K bytes of high speed ram. Compatible with all software, operating systems and hardware! Your program speed is increased by a factor of 25 to 40. Flopping point programs run up to 2.8 times faster on the PC than on an 80287 equipped PC AT..... **\$1049**

MATRIXPAK™ manages a MEGABYTE! Written in assembly language, our runtime package accurately manipulates large matrices at very fast speeds. Includes matrix inversion and the solution of simultaneous linear equations. Callable from MS Fortran 3.3, 87MACRO, and 87BASIC/INLINE..... each **\$150**

87FFT™ Written in assembly language, performs Forward and Inverse FFTs on real and complex arrays which occupy up to 512K bytes of RAM. Also does convolutions, auto correlations, hamming, complex vector multiplication, and complex to radial conversions. Callable from MS Fortran, 87MACRO, C, TURBO PASCAL or 87BASIC/INLINE..... **\$200**

87FFT-2™ performs two-dimensional FFTs. Ideal for image processing. Requires 87FFT **\$100**

GRAPHICS PACKAGES

Gratmatic for Fortran or Pascal..... **\$125**
Platmatic for Gratmatic..... **\$125**
MultiHalo (one language)..... **\$189**

DFixer™ - Eliminates the AT hard disk problem! A disk which thoroughly checks PC or AT hard disk for bad sectors and updates the MS DOS file allocation table accordingly..... **\$149**

EPSILON™ - our favorite in-house editor lets you simultaneously edit up to 11 source files and simultaneously run a compiler or linker. A real timesaver!..... **\$185**

87BASIC/INLINE™ converts the output of the IBM Basic Compiler into optimized 8087 inline code which executes up to seven times faster than 87BASIC. Supports separately compiled inline subroutines which are located in their own segments and can contain up to 64K bytes of code. This allows programs greater than 128K! Requires the IBM Basic Compiler and Micro Assembler. Includes 87BASIC..... **\$200**

87BASIC™ includes patches to the IBM Basic Compiler and both runtime libraries for USER TRANSPARENT 8087 support. Provides super fast performance for all numeric operations including trigonometrics, transcendental, addition, subtraction, multiplication, and division..... **\$150**

87MACRO/DEBUG™ contains all the pieces needed for writing 8087/80287 assembly code including 8087 macros, object libraries for commonly used functions, including transcendental, trigonometrics and conversions between strings and real numbers. Our 87DEBUG completes the package..... **\$199**

OBJ-ASM™ - a multipass object module translator and assembler. Produces assembly language listings which include public symbols, external symbols, and labels commented with cross references. Ideal for patching object modules for which source is not available..... **\$200**

RTOS - REAL TIME OPERATING SYSTEM RTOS is a multi-user, multi-tasking real time operating system. It includes a configured version of Intel's iRMK-86, LINK-86, LOC-86, LIB-86, OH-86, and MicroWay's 87DEBUG. Runs on the IBM-PC, XT, PC-AT and COMPAQ..... **\$400**

INTEL COMPILERS*

FORTRAN-86..... **\$750**
PASCAL-86..... **\$750**
PL/M-86..... **\$500**
ASM-86..... **\$200**

*Requires RTOS or iRMK-86. All Intel compiler names and iRMK-86 TM Intel Corp.

FASTBREAK™ MicroWay's software turns on your 8087 during 1-2-3™ execution. Recalculations run up to 36 times faster. When used with the NUMBER SMASHER™ it can provide a total increase in 1-2-3™ execution speed of up to 79 to 1. FASTBREAK provides you with the unique capability for running other programs on top of 1-2-3. These programs can be written in BASIC, PASCAL, Fortran or C and can access the current values in your 1-2-3 worksheet..... **\$79**

FASTBREAK & NUMBER SMASHER..... \$1099

8087 5mhz..... \$109
Including DIAGNOSTICS and one-year warranty for IBM PC and compatibles.

8087-3 5mhz..... \$175
For the Tandy 1200.

8087-2 8mhz..... \$175
For Wang, AT&T, DeskPro, NEC, Leading Edge.

80287-3 5mhz..... \$199
For the IBM PC AT and Compaq DeskPro 286.

287Turbo™ 8 mhz..... \$395
With Reset Button and Diagnostics.

64K RAM Set..... \$8

256K RAM Set..... \$29

256K CMOS RAM Set..... \$39

128K RAM Set PC AT..... \$89

INTEL ABOVE BOARD..... CALL

JRAM-2™ (8K)..... \$169

JRAM™ AT (8K)..... \$229

JRAM-3™ (128K)..... \$275

MAYNARD ACCENT..... \$225

FORTRAN, C and BASIC

Microsoft Fortran Version 3.3..... **\$229**

IBM Professional Fortran..... **\$45**

Ryan-McFarlane Fortran..... **\$99**

FORLUS™ or STRINGS and THINGS..... **\$5**

Latitude C or Microsoft C Version 3.0..... **\$299**

Float87..... **\$150**

IBM Basic Compiler Version 2.0..... **\$445**

Microsoft Assembler Version 3.0..... **\$125**

Summit BetterBASIC..... **\$175**

True Basic..... **\$105**

MACRO ASSEMBLERS

IBM Assembler with Librarian V.2.0..... **\$155**

Microsoft Assembler Version 3.0..... **\$125**

PASCAL and APL

Microsoft Pascal Version 3.3..... **\$99**

Borland Turbo with 8087 Support..... **\$85**

STSP APL+PLUS/PC..... **\$50**

STATGRAPHICS..... **\$595**

COSMOS Revelation..... **\$750**

Phoenix PINK8..... **\$295**

SPSS/PC..... **\$95**

FASTBREAK and NUMBER SMASHER are trademarks of MicroWay, Inc. Lotus and 1-2-3 are trademarks of Lotus Development Corp.

European Customers: Please call MicroWay in London at 01-223-7662.

MicroWay

P.O. Box 79
Kingston, Mass.
02364 USA
(617) 746-7341

**The World Leader
in 8087 Support!**

jet is great! But if you don't have the dough, or don't need the typeset quality, or do need conventional flexibility, forget about a laser printer.

Bob Arnold argues for the new breed of cheap (about \$300) near-letter-quality, dot matrix printers. Certainly the price is fabulous, and the features and quality are much better than those of older dot matrix printers. For the individual PC user, they make the most sense. But I've been trying to get away from the noise and the messy appearance of even the best letter quality dot matrix print for years.

A laser printer gives you a very special advantage—near-typeset quality quickly and quietly—at the cost of much of the flexibility of conventional printers.

Mr. Arnold claims that laser printers are only justified when you have to do a lot of in-house typesetting. Nonsense. How many offices do you know of that use fabric ribbons in their typewriters? Fabric typewriter ribbons may be a lot cheaper than film ribbons, but they long ago lost out in offices to the better appearance of film. In the same way, it won't be long before anything short of a laser printer is considered inadequate for a modern office.

I am convinced that the middle is being squeezed out of the printer market. With \$300 wonders on the low end and laser printers on the top, middle-price, middle-quality printers look less and less attractive.

Bernoulli Boxes

Bob Arnold also criticized the praise I lavished on tape backup systems; he favors twin Bernoulli Boxes. He has a good point, although I don't use a Bernoulli Box myself.

Omega's Bernoulli Boxes give you the advantages of both hard disks and of diskettes at the same time. A removable disk, in place of a hard disk, solves a lot of prob-

lems. You can transfer your data from computer to computer, or just lock it up, something that you can't do with a fixed disk.


Bernoulli Boxes address another issue as well that's part practical, part philo-

sophical. There's a real case to be made against having a backup medium that isn't also a work-a-day part of your system; it's a wasteful single-purpose accessory that's not continually tested by use the way other

Works with
Wordstar, Microsoft Word,
Word Perfect, Multimate and
virtually all other word processors.

The Random House Reference Set

(Manual version.)



The Random House Reference Set

(Pop-in version.)

Introducing the Reference Set™ Pop-in speed, Random House power, light-weight price.

80,000 words and 50,000 synonyms. Now. That's what you get with the Reference Set. Just add your PC and two fingers and you'll never have to exit your word processor to check spelling again. Or search a Thesaurus for a better word than the tired old one you've used once too often... if you can find the Thesaurus.

Change vacuum to vacuum in three seconds. Common to ubiquitous in four. The Reference Set makes your writing better. Without pain or practice. Here's how.

Snap, Crackle, Pop.

You're working on an important cederal proposal and things take a turn for the worse. Crackle... is it "cl" or "lc"? Not to worry. Reference Set to the rescue. Snap. Hit Alt D and up comes "crackle" in a window on your screen (without disturbing your word processor). Tap Ins and pop the corrected spelling back into your proposal. Now, look around to see if

anybody below the age of 10 was watching. And if you want to be absolutely, positively sure nothing else is wrong, use Reference Set's full document spelling checker.

Our Thesaurus works the same way. Alt T... choose your synonym ... Ins. Turn "Thesaurus" into "Synonymicon," or storehouse or repository or treasury. Instantly. It's as simple as that.

Only \$89.95

A desk full of Random House on a couple of floppies. For a limited time, \$89.95 buys it all. Or \$69.95 gets the Thesaurus alone. But you can try it FREE. Because if for any reason you aren't happy with the program, send it back within 30 days. We'll send back your money. ~~Just say so.~~ Instantaneously... Quickly.

Order Now: 1-800-826-2222
(415) 947-1000 (in California)

Reference Software

2363 Boulevard Circle
Walnut Creek, CA 94595
Mail Orders Welcome

Please do not use software for its shipping or handling.

Random House and the House design are registered trademarks of Random House, Inc. Synonymicon Dictionary ©1982 Random House, Inc. ©1985 Reference Software, Inc. Wordstar, Microsoft Word, Word Perfect and Multimate are trademarks.

"The Last Word In Monochrome"

High Resolution Graphics, Multifunctionality, 384K Ram Expansion and 132 Column "Bigscreen" in One IBM PC Slot!

Lotus® Graphics



Lotus® 132 Column



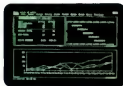
Autocad® engineering graphics



Microsoft Windows®



Lotus® Symphony®



80132 Column Terminal Emulation



Ashton-Tate® Framework®



UltraPAK-S, UltraPAK and the UltraPAK/AGE A Complete Family of Integrated Boards

Presenting the complete family of integrated video/multifunction enhancement boards for the IBM PC/XT/AT and compatibles... The UltraPAK Family from Tseng Laboratories. If your needs are simple, e.g. monochrome graphics and a printer port, or if your needs are complex, requiring all your video graphics and multifunction expansion to fit into one slot in your IBM PC/XT/AT or compatible, Tseng Labs UltraPAK Family has the right product at the right price for you. The UltraPAK family pioneered the concept of integrating graphics and multifunction capability in one product.

Our popular 132 column "Bigscreen" supports a wide range of IBM PC compatible terminal emulation products from DEC VT/100 and Tektronix 4010 software, to IBM compatible 3278/79 hardware (Mod 2 or 5). In fact there is no 132 column video board recommended by more vendors of terminal emulation products than the UltraPAK family. Popular spreadsheets, integrated software and word processors are also supported by the 132 column Bigscreen. PC Magazine called UltraPAK "the last word in monochrome (graphics cards)." We are confident you will feel the same way about the UltraPAK family!

Systems Supported: IBM PC/XT/AT, Compaq Deskpro, Sperry, Leading Edge, Eagle, Kaypro 286 and many others.

With IBM compatible monochrome monitor: AT&T 6300, Compaq Portable, IBM Portable, and many others.

Lotus 1-2-3 and Symphony are TM of Lotus Development Corporation. PC/XT/AT are TM of IBM. Framework is a TM of Ashton-Tate. Autocad is a TM of Autodesk. Deskpro is a TM of Compaq. Hercules is a TM of Hercules Computer Corp.



Tseng Laboratories Inc.

205 Pheasant Run Rd., Newtown, PA 18940
(215) 968-0502, TELEX 705179

Enhancement Technology
For Personal Computers
MADE IN THE USA

Product Features	UltraPAK-S \$499	UltraPAK \$649	UltraPAK/AGE \$799
IBM Monochrome Compatibility (80x25 Text)	✓	✓	✓
High Resolution Mono/Graphics 720x348 Hercules™ Compatible	✓	✓	✓
132 Column "Bigscreen" Text Display (5x7 Character/6x8 Box)	✓	✓	✓
Parallel Printer Port	✓	✓	✓
Serial Communications Port	N/A	✓	✓
Clock Calendar w/Battery	N/A	✓	✓
DISKMASTER UTILITY Software (Ram disk, printer spooler)	✓	✓	✓
384K RAM Expansion Piggyback Module	Optional \$199	Optional \$199	✓
UltraSERIAL (Second Serial Port)	N/A	Optional \$50	Optional \$50
UltraFONT™	Optional \$39	Optional \$39	Optional \$39
SoftPAK II Short Card (Color Emulation at Hardware Level)	Optional \$99	Optional \$99	Optional \$99
RAM KIT/384	Optional \$199	Optional \$199	Optional \$199

*Memory expansion daughter card utilizes one bank of 256K DRAMS and two banks of 64K DRAMS when RAM kit installed. **Character generator chip providing 5x9 character in 6x14 box. Especially useful for 132x25/28 terminal emulation video support.

CIRCLE 540 ON READER SERVICE CARD

A Reader's Thoughts on Ye Perfekt PC

Norton reconsiders his hardware picks for the prudent PC owner in light of a thoughtful reader's criticisms. At least on Bernoulli Boxes, he finds himself persuaded.

I'm interrupting my tutorial series of the last two issues on disks and damage, data recovery and repair, to discuss your responses to my columns.

I'd like to give a special salute to Robert Arnold of Idaho, who sent in a letter about my hardware picks for the best-equipped PC prudent that money can buy. He disagreed with nearly everything I picked, but he had good reasons in each case. Since we're talking about judgment calls here, I'd like to stir in some of Mr. Arnold's perspective.

Surge Suppressors

Number one on Mr. Arnold's list is a surge suppressor. I've never really believed in them, so I usually don't remember to recommend them to people. I figure if we really needed these things they would be built into the PC's power supply. And I doubt that I've ever lost data owing to a power surge. Nonetheless, if you happen to trace the power cord on my machine, you'll find it plugged into—you guessed it—a surge suppressor. I don't believe in them, but I always equip my systems with surge suppressors anyway.

Arnold favors the big fat kind, such as the Power Director by Computer Accessories, with the various power switches and indicator lights that you place on top of your system unit under the monitor. He says the pretty lights impress people walking by his office. I say the pretty lights just distract you, making it harder to work. I favor the plug-into-the-wall variety that's out of sight (which is why I keep forgetting I have a surge suppressor) like the Curtis Sapphire, which is busy protecting these very words even as I write them.

Laser Printers

Lately I've been singing the praises of laser printers in general and the HP Laserjet in particular. Bob Arnold takes exception to that pick as well. He finds laser printers a pain in the ASCII as well as the



Peter Norton

wallet because you can't see what's a-printing until a whole page is done. But that was once a standard grumble about printers that print only a full line. We all grew and got used to line-at-a-time printing, and as it turned out, its advantages far outweigh the disadvantages of not seeing each character appear as it is sent to the printer. The same is true of page-at-a-time printers like the Laserjet.

Seeing nothing but a whole page in print, however, is just a small point in the big laser printer picture. The real issue is that they're simply very different from conventional printers.

If you do all your printing on conventional 8½ by 11 paper, you'll never have to

think about the limitations of laser printers. But they have some very real ones. First, like other nonimpact printers (such as the IBM Quietwriter, which I also highly recommend), you can't simultaneously make multiple copies—no impact, no carbon copies. And second, you can't use continuous forms in a laser printer.

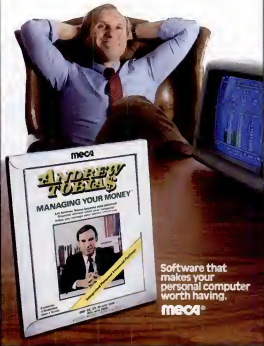
The last of continuous form prevents you from using a laser printer for lots of things. Address labels are one example. I thought that address labels would be no sweat on my Laserjet, since you can get sheets of address stickers that are designed to feed through photocopiers (which is what laser printers are based on) without gumming up the works. While this procedure works in theory, it doesn't in practice.

Part of the problem is that standard sheets of address stickers come with three columns of labels per page, so you have to switch your print formatting to three across, rather than print a continuous stream of labels. Another wasteful little problem is that a laser printer can't print close enough to the edge of the paper to use the top and bottom rows of labels; that's 2 out of 11 rows, or 18 percent, wasted. The final straw, though, is that the address label sheets won't feed properly out of the laser printer's paper cartridge, so you have to hand-feed each one. You will run into similar special problems with any other type of continuous-form printing that you attempt on a laser printer.

Clearly, a laser printer is not for everyone. It's a special printer that gives you a very special advantage—near-typeset quality quickly and quietly—at the cost of much of the flexibility of conventional printers. To me it's no contest: My Laser-

MANAGING YOUR CHECKBOOK?
 MANAGING YOUR BUDGET?
 MANAGING YOUR BILLS?
 MANAGING YOUR CASH FLOW?
 MANAGING YOUR TAXES?
 MANAGING YOUR INSURANCE?
 MANAGING YOUR STOCKS?
 MANAGING YOUR BONDS?
 MANAGING YOUR REAL ESTATE?
 MANAGING YOUR TAX SHELTERS?
 MANAGING YOUR SAVINGS?
 MANAGING YOUR MORTGAGE?
 MANAGING YOUR AUTO LOAN?
 MANAGING YOUR RETIREMENT?
 MANAGING YOUR CALENDAR?
 MANAGING YOUR CHARGE ACCOUNTS?
 MANAGING YOUR CAPITAL GAINS?
 MANAGING YOUR ANNUITIES?
 MANAGING YOUR APPOINTMENTS?
 MANAGING YOUR DIVIDENDS?
 MANAGING YOUR INTEREST?
 MANAGING YOUR RECORDS?
 MANAGING YOUR VALUABLES?
 MANAGING YOUR KEOGH'S?
 MANAGING YOUR IRA'S?

MANAGING YOUR MONEY®
 BY ANDREW TOBIAS.
 THE ONLY FINANCIAL
 SOFTWARE THAT DOES IT ALL.



Software that
 makes your
 personal computer
 worth having.

meca®

THE PROFESSIONAL'S CHOICE

NEW Lotus 1-2-3 \$319	NEW Lotus Symphony \$439	dBase III \$369	NEW FrameWork II \$369	MultiMate \$219	NEW Word Perfect 4.1 \$209
-----------------------------	--------------------------------	--------------------	------------------------------	--------------------	----------------------------------

Software

Word Processing Editors

FANCY FONT	\$130
FINAL WORD	\$179
MICROSOFT WORD	\$219
MULTIMATE	\$219
MULTIMATE ADVANTAGE	\$269
OFFICE WRITER/ SPELLER	\$239
PPE WHITE	\$180
SAMMA WORD III	\$259
VOLKSWRITER	\$199
DELUXE	\$199
PC WRITER	\$269
SCIENTIFIC	\$269
WORD PERFECT 4.1	\$269
WORDSTAR	\$199
WORDSTAR 2000	\$249
WORDSTAR 2000-WORDSTAR PRO	\$269
XYWRITE II	\$199

Database Systems

ALPHA DATA BASE MANAGER II	\$179
CLIPPER	\$369
CLOUT V.2.0	\$179
CONDOR II	\$339
CONNECTONE	\$279
DARE III	\$339
KNOWLEDGE ORGANIZER 2	\$339
PARADOX	\$139
PC FOCUS	\$1139
PFS: FILE/PFS REPORT	\$219
POWERBASE	\$219
QUICKCODE III	\$159
QUICKREPORT	\$159
R BASE 3000	\$339
REFLEX	\$79
REVELATION	\$629

Spreadsheets/Integrated Packages

ELECTRIC DESK ENABLE	\$209
FRAMENWORK II	\$349
JAZZ	\$399
LOTUS 1-2-3	\$319
MULTIPLAN	\$139
OPEN ACCESS	\$359
SMART SYSTEM SPREADSHEET	\$629
AUDITOR	\$109
SUPERCALC 3	\$209
SYMPHONY	\$439

Graphics

BPS BUSINESS GRAPHICS	\$229
CHARMASTER	\$219
CHARSTAR	\$169
CHARTMAN MASTER	\$219
ENRICHVISION	\$219
ENERGYGRAPHICS	\$199
PRELAW	\$239
OEM DRAW	\$199
GRAPHWRITER COMBO	\$339
IN-A-VISION	\$119
MS CHART-NEW OVERHEAD	\$159
EXRESS	\$249
PC DRAW	\$249
PC PAINTBRUSH	\$180
PFS: GRAPH	\$180
SIGNMASTER	\$159

Project Management

HARVARD TOTAL PROJECT MANAGER	\$279
MICROSOFT PROJECT-NEW	\$249
PROJECT SCHEDULER	\$229
NETWORK SUPERPROJECT	\$339
TIMELINE 2.0	\$229

Desktop Environments

DESK ORGANIZER	\$180
OLEX DESKTOP	\$180
SEEDUCK	\$180

Communications/Productivity Tools

CRIOSTALK MKIV	\$149
PROKEY	\$180
KEYWORDS	\$180
RELAY GOLD	\$349
REMO	\$349
SMARTER	\$349
SMARTCOS II	\$349
SUPERKEY	\$180

Statistics

SPSS PC	\$695
STATPAK-MWA	\$329
STATPAC	\$329
WALCH	\$349
STATAT	\$419

Professional Development

LIQHTYEAR	\$219
THINK TANK	\$109

Languages/Utilities

CONCURRENT DOS	\$189
CW C COMPILER	\$799
DR FORTAN 77	\$219
FASTTRACK	\$119
LATTICE C COMPILER	\$289
MARK WILLIAMS C	\$319
MICROSOFT C COMPILER	\$249
MS BASIC COMPILER	\$249
MS FORTRAN	\$229
NORTON UTILITIES	\$180
QUICK BASIC	\$179
TURBO PASCAL	\$49
XENIX	\$349

Accounting

801 GREAT PLAINS	\$299
ILS EASYBUSINESS	\$479
ONE WHITE PLUS	\$319
OPEN SYSTEMS	\$179
PERIPHERAL REAL WORLD	\$299
STAR ACCOUNTING PARTNER	\$349
STAR ACCOUNTING PARTNER II	\$329

Hardware*

Display Boards

AST PREVIEW	\$279
EVEREX GRAPHICS	\$309
EDGE	\$219
GEMMA SPECTRUM	\$219
MERCURUS GRAPHICS	\$219
CARD	\$299
MERCURUS COLOR	\$159
CARD	\$159
PARADISE MODULAR	\$275
GRAPHICS	\$275
PARADISE	\$295
MULTIMEDIA LAY CARD	\$295
SIGMA COLOR 400	\$499
STC CHARTER	\$275
TECHNAR GRAPHICS	\$429
MASTER	\$429
TREND ULTRA PAK	\$369
TREND ULTRA PAK-S	\$369

Multifunction Boards

AST ADVANTAGE	\$399
AST 9 PAK PLUS (8K)	\$229
AST 9 PAK PLUS (384K)	\$419
GOLD QUADBOARD (8K)	\$419
ORCHID (8K)	\$199
ORCHID BLOSSOM	\$199
ORCHID PC TURBO	\$249
ORCHID (384K)	\$249
PERYST TIME SPECTRUM	\$199
QUADBOARD (8K)	\$249
QUADBOARD (384K)	\$219
SILVER QUADBOARD	\$219
TECMAR CAPTAIN	\$180
TECMAR CAPTAIN	\$229
TECMAR JR. CAPTAIN	\$229
TECMAR JR. CAPTAIN	\$229
TECMAR WAVE (8K)	\$229

Emulation Boards

AST 5201-11	\$899
AST 5201-12	\$899
AST 5201-13	\$899
AST 5201-14	\$899
AST 5201-15	\$899
AST 5201-16	\$899
AST 5201-17	\$899
AST 5201-18	\$899
AST 5201-19	\$899
AST 5201-20	\$899

Networks

AST PC NET	\$349
KEYTRONIC S191	\$179
ORCHID PC NET	\$349
3 COM	\$349
Mass Storage/Backup	\$219
EXCEL STREAM 80 TAPE	\$219
(INT)	\$219
IONEMGA BERNOLLI	\$899
BOX-NEW	\$2445
IRWIN 310A 10MB TAPE	\$179
(INT)	\$179
IRWIN 1100 10MB TAPE	\$179
(INT)	\$179
MAYTRAM 60MB TAPE	\$400
MOUNTAIN DRIVECARD	\$1199
ORCHID	\$1199
TALL ORCHID	\$1199
TECMAR 40-40AT TAPE	\$1199
(INT)	\$1199

Monitors

AMOR 2104	\$199
AMOR 200-100	\$249
AMOR 600-710	\$449
PRINCETON HX-12	\$459
PRINCETON MAX-12E	\$179
PRINCETON HX-12	\$579
PRINCETON HX-12E	\$579
PRINCETON HX-9	\$579
TAXAN 122 AMBER	\$159
TAXAN 630-640	\$499

Modems

AST REACH 1200	\$389
HAYES 1200	\$389
HAYES 1200B	\$389
HAYES 2400	\$579
TRAVELER 1000	\$299
VENTEL 1200	\$389
HALF CARD	\$499
WATCHDOG	\$499

Printers/Plotters

BROTHER TWINWRITER	\$639
DIABLO	\$349
EPSON FX-85	\$349
EPSON FX-105	\$499
EPSON LX-1000	\$899
HP 1470A	\$349
JUKI 6301	\$899
NEC ELT 300	\$439
NEC 3550	\$1139
OKI 4100	\$539
OLIVE SPRINT 1155	\$1589
SWEET P 800	\$799
T1055	\$1139
TOSHIBA P351	\$1139

Input Devices

KEYTRONIC S191	\$179
ORCHID PC NET	\$349
3 COM	\$349
Mouse	\$129

Accessories

CURTIS SURGE	\$349
PROTECTORS	\$349
DATASHELD BACKUP	\$349
POWER	\$349
MASTERPIECE PLUS	\$135
MICROFRAZER INLINE	\$219
THIPLITE BACKUP	\$349
25K RAM SET	\$135
8007 MATH CHIP	\$135

Helicules Graphics Card \$299	Mountain Drivecard 10 \$789	Quadboard 384K \$219	Six Pak Plus 384K \$249	Smartmodem 1200B \$349	Smartmodem 2400 \$579
-------------------------------------	-----------------------------------	----------------------------	-------------------------------	------------------------------	-----------------------------

*CALL FOR SHIPPING COSTS

FREE SHIPPING
on all credit card or prepaid orders
and all orders over \$1000

LOWEST PRICE GUARANTEE!!
We will match current nationally advertised prices on most products.
Call and compare.

free!
Diskette Library Case with your order

1-800-221-1260
In New York State call (718) 438-6057

TERMS
Checks—allow 14 days to clear. Credit processing—add 3%. COD orders—cash.
M.O. or certified check—add \$1.00. Shipping and handling UPS surface—add \$3.00
per item (UPS Blue \$1.00 per item). NY State Residents—add applicable sales tax.
All prices subject to change.

Softline
Softline Corporation
P.O. Box 729, Brooklyn, N.Y. 11230
TELEX: 421047 ATLN UI
FAX: 718-972-8346

MON.-THURS. 9:00AM-8:00PM
SUN. & FRI. 9:00AM-4:00PM



Technical Bulletin

No. 2 in a series.

SUBJECT: Engineering a LAN for Maximum Flexibility.

Quantum Software Systems Ltd. proudly announces QNX 2.0 — the Ultimate Distributed Network Operating System. QNX 2.0 is now available for the IBM-PC, IBM-AT, PC compatibles, DEC Rainbow and TANDY 2000. If you have been waiting for a Real-time Multi-tasking Multi-user Operating system with fourth generation LAN support, then QNX 2.0 can offer you today what the competition can't even begin to promise for the future.

QNX 2.0 integrates the Local Area Network architecture right into the heart of the operating system, at the fundamental level of intertask communication allowing tasks to communicate transparently with other tasks across the whole network. This means that any task (program/application) may access ANY serial port, ANY printer or ANY disk on the network. There are no artificial restrictions. Every PC with a disk is a potential file server. PCs without disks will automatically BOOT over the network.

QNX on the IBM-PC AT:

QNX is the first Multi-tasking Multi-user Operating system available for the AT. It is available in both networked and single machine configurations. At about 2.5 times faster than the QNX 8086 PC based systems, and 10 times faster than other multi-tasking operating systems on the same processor, QNX is the ideal program development environment.

O/S	Computer	Processor	Measured time
QNX™	IBM-PC AT	80286	480 usec
XENIX™	Intel-286	80286	4,930 usec

File Security:

Designed with extensive file security features, QNX 2.0 provides login protection with network wide file permission checking based on 255 groups of 255 users. In addition, each PC user may control network access to devices attached locally to their machine.

Distributed Processing:

The QNX LAN supports distributed processing as well as distributed devices. Tasks may be executed on remote stations as easily as they may be executed on the local work station. This allows pure processing elements (PCs without keyboards or screens) to be plugged into the network to be used as an

un-committed processing resource. This is ideal for real-time, process control, data acquisition and data communication applications.

Global Communications:

QNX supports a full implementation of X.25 allowing connection to public networks such as Telenet and Datapac. This allows you to link geographically separate LANs together providing true global area networking.

Cost Effective Growth and Flexible Solutions:

QNX is affordable, and will work with the PCs you use today and those you will use tomorrow. You may mix and match different brand PCs on the same QNX network with absolute ease. Multi-user expansion may be accomplished by adding terminals to PCs or PCs to the network. You can start your multi-user application on a single PC with 1 to 10 attached terminals. Once your single processor starts to show signs of degradation, add another PC and connect terminals to the new processor. If the disk becomes the major bottleneck, you may add hard disks to other attached PCs to distribute the processing. Applications which are very CPU intensive may wish to limit a single user to each processor and expand the system with low cost diskless PCs used as work stations. QNX does offer a truly cost effective and flexible solution to your applications needs.

Portability:

QNX 2.0 is portable. The operating system is independent of the physical local area network. It is available in a form suitable for porting to other 8088/8086/80186/80286 computers in the consumer, educational and industrial market place. QNX is ROMable and can operate in as little as 128kb RAM.

DOS Compatibility:

PC-DOS version 2.1 can run as a task under the QNX 1.2 or 2.0 operating systems. QNX will also allow transparent access to the DOS file system partition and floppies.

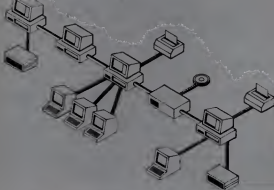
QNX Products:

QNX Operating System
Full Screen Multi-terminal Editor
Extended Utilities
C Compiler & 8086 Assembler
Basic Compiler
Obol (dibol) Compiler
Text Processor
Real Time Spelling Checker

PC-DOS Emulator
Electronic Mail
Electronic Teleconferencing
Full Screen Menu Developer
Isam File Utility
Networking Board
OEM Customization Kit
(to port QNX)

Established:

Quantum sold over 10,000 copies of its operating system during 1984, into all business systems environments, to developers of real time applications, government and educational systems, to software developers/integrators, universities and research establishments.



Moodie Drive, HiTech Park, 215 Stafford Rd.
Ottawa, Canada K2H 9C1 (613) 726-1893

KEYTRONIC KB-5150

IBM-PC Keyboard

\$9999

WORDSTAR Professional
w/GL Demo

\$18900

SOFTWARE FOR IBM

ASHTON-TATE ■	IBM ■
Framework II	\$399.00
dBASE II	\$299.00
dBASE III	\$369.00

BOYARD ■	MICROSOFT ■
Turbo Pascal 3.0	\$49.99
Superkey	\$44.99
Sidekick (Unprotected)	\$59.99
Reflex	\$64.99

CENTRAL POINT ■	MICROSOFT ■
Copy II PC-Backup	\$29.99
Continental Software	
Home Accountant Plus	\$79.99
1st Class Mail	\$79.99

DECISION RESOURCES ■	MultiMate ■
Charmaster	\$229.00
Signmaster	\$189.00
Diagram Master	\$219.00

FIFTH GENERATION ■	PC ■
Fastback	\$109.00
Peachtree 5000	\$169.00

FIRST STEP ■	THORNTON UTILITIES ■
Golf's Best	\$34.99
Norton Utilities (IBM)	\$59.99

ENERTRONICS RESEARCH ■	IBM ■
Energistics/Plotter	\$289.00
Sideways	\$39.99

FUNK SOFTWARE ■	IBM ■
Harvard Software Inc.	
Harvard Project Manager	\$209.00
Total Project Manager	\$269.00

Hayes ■	Professional Software ■
Phrase (Date Base)	\$199.00
PC Pentabush	\$89.99
PC Mouse/Paint	\$139.00

IBM ■	RoseSoft ■
File/Graph/Plan	(as) \$79.99
Report	\$74.99
Write/Print combo	\$79.99
First Success	\$189.00

IBM ■	Professional Software ■
PC Plus/The Box	\$249.00
Pro Key	\$69.99

IBM ■	SOFTWARE GROUP ■
Comerstone	\$269.00
Enable	\$339.00

IBM ■	SORC/M/IUS MICRO SOFTWARE ■
Accounting	API/AR/GRUNOE (as) \$299.00
Supercalc III	\$199.00
EasyWriter II System	\$199.00
Super Project	\$199.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM ■	SPI ■
Open Access	\$379.00
Word Perfect 4.1	\$219.00

IBM PC
IBM-XT
IBM-AT
SYSTEMS

Configured to your specifications.

Call for the price and availability of your system requirements.



Safen (7300)	CALL
5300	CALL

COMPAG	
Portables	CALL
Desk Pros	CALL
AT286	CALL

KAYPRO	
KP-2000 Portable	CALL

ITT X-TRA	CALL
256K, 2 Drive System	CALL
256K, 10 meg Hard Drive System	CALL
XPS, 20 meg	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SANVO	
MBC 550-2 Single Drive	CALL
MBC 550-2 Dual Drive	CALL
675 Portable	CALL
880 Desktop	CALL
775 Portable	CALL

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

SPERRY	
Sperry-IT As Low As	\$1749.00
Sperry-IT As Low As	\$2699.00

ACCESSORIES

MEMORY CHIPS	
4164 RAM Chips (as) \$1.59	
128 RAM Chips (as) \$5.99	
256 RAM Chips (as) \$4.99	

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL
KB5152/KB5153/KB5154J	CALL

KEYBOARDS	
key tronk	
KB5150/KB5151/KB5151J	CALL

THE CMO ADVANTAGE

- ✓ THE BEST PRICES!
- ✓ Next day shipping on all in stock items.
- ✓ Free easy access order inquiry.
- ✓ Orders from outside Pennsylvania save state sales tax.
- ✓ Free technical support with our factory trained technical staff.
- ✓ There is no limit and no deposit on C.O.D. orders.
- ✓ There's no extra charge for using your credit card. Your card is not charged until we ship.
- ✓ No waiting period for cashiers checks.
- ✓ We accept purchase orders from qualified corporations. Subject to approval.
- ✓ Educational discounts available to qualified institutions.
- ✓ FREE CATALOG MEMBERSHIP

ORDER LINE

CALL TOLL-FREE
1-800-233-8950
CUSTOMER SERVICE & TECH SUPPORT
 1-717-327-1450

Dept. B101

MAILING ADDRESS

Computer Mail Order
 Dept. B101
 477 East Third Street
 Williamsport, PA 17701



MEMBER DIRECT MARKETING ASSOCIATION

CREDIT CARDS



SHIPPING

Add 3%, minimum \$5.00 shipping and handling on all orders. Larger shipments may require additional charges.

All items subject to availability and price change.

Returned shipments may be subject to a restocking fee.

CANADIAN ORDERS

1-800-268-3974
 Ontario/Quebec

1-800-268-4559
 Other Provinces

1-416-828-0866
 In Toronto

TELEX: 06-218960

2505 Dunwin Drive,
 Mississauga, Ontario
 Canada L5L1T1

All prices shown are for U.S. orders.

Call The Canadian Office for Canadian prices.

DRIVES

HARD



10 meg Internal (IBM)\$399.00
 20 meg Internal (IBM)\$549.00



10 meg Bernoulli Box\$1099.00
 20 meg Bernoulli Box\$2499.00



25, 35, 50, 80 meg (PC)from \$1499.00



Tape BackupCALL



80 meg internal tape backup\$629.00



320K 5 1/4"\$109.00



320K 5 1/4"\$109.00

MODEMS



Volkmodem\$59.99
 Volkmodem 300/1200\$189.99
 Signetman Express\$299.00
 Lightning 2400 Baud\$399.00



Smartmodem 300\$139.00
 Smartmodem 1200\$389.00
 Smartmodem 1200B\$359.00
 Smartmodem 2400\$599.00
 Smart Com II\$89.99
 Chronograph\$199.00
 Transet 1000\$309.00



1200 Internal Modem\$199.00



Reach 1200 Baud Half Card\$399.00



J-Cat\$99.99
 Smart Cat Plus\$319.00
 Novation 2400\$499.00



Quadrom II\$339.00
 300/1200\$499.00

INTERFACES



Microbufferfrom \$169.00



MicroLaserfrom \$139.00
 Elzeir (Epson)from \$79.99

DIGITAL DEVICES

Printer Buffer 16K\$74.99

GRAPHICS



Painta\$1299.00

MONITORS



300 Green\$129.00
 300 Amber\$139.00
 310 Amber IBM-Plug\$189.00
 Color 300 Composite\$179.00
 Color 500 Composite/RGB\$289.00
 Color 600 Hi-Res (840x240)\$399.00
 Color 710 Long Phosphor\$489.00
 Color 722 IBM Enhanced\$509.00



JB 1270 Green (IBM)\$99.00
 JB 1275 Amber\$99.00
 JB 1280 G TTL1285 A TTL/Line\$139.00
 JC 1225 Composite Color\$179.00
 JC 1460 Color RGB\$289.00
 JC 1410 Color RGB\$699.00



MAX-12E Amber\$179.00
 HX-9" RGB\$469.00
 HX-9E Enhanced\$519.00
 HX-12 12" RGB\$469.00
 HX-12E Enhanced\$559.00
 SR-12 Hi-Res\$599.00
 SR-12P Enhanced\$649.00



115 12" Green Mono\$119.00
 118 12" Amber Mono\$129.00
 121 Green TTL\$139.00
 122 Amber TTL\$149.00
 620 840x200 RGB\$199.00
 630 840x200 RGB\$199.00
 640 720x400\$199.00



8400 Quadchrome\$479.00
 8410 Quadchrome II\$339.00
 8420 Amberchrome\$179.00
 8500 Quad Screen\$1499.00



ZYM 1220/1230 (ea.)\$99.99
 ZYM 1240 IBM Amber\$149.00
 ZYM 131 Color\$249.00
 ZYM 133 RGB/Color\$429.00
 ZYM 135 RGB/Color\$459.00
 ZYM 136 RGB/Color\$599.00



3 1/2" SS/DD\$24.99
 3 1/2" DS/DD\$39.99
 5 1/4" MD-1 w/Hardcase\$12.99
 5 1/4" MD-2 w/Hardcase\$16.99
 5 1/4" MD-3 HD for AT\$39.99



5 1/4" SS/DD\$19.99
 5 1/4" DS/DD\$24.99
 Disk Analyzer\$24.99



Elephant 3 1/2" SS/DD\$29.99
 Elephant 5 1/4" SS/DD\$13.99
 Elephant 5 1/4" SS/DD\$15.99
 Elephant 5 1/4" DS/DD\$16.99
 Elephant Premium DS/DD\$22.99



5 1/4" DS/DD Floppy Disks (box of 10)\$25.99



Flip-n-File 10\$3.99
 Flip-n-File 50\$17.99
 Flip-n-File 50 w/lock\$24.99
 Flip-n-File (400/800 ROM)\$11.99
 Flip-n-File 100\$24.99



50 Disk Tub 5 1/4"\$9.99
 30 Disk Tub 3 1/2"\$6.99

PRINTERS



A40CALL
 LBP-8AT LaserCALL



MSP-10 (80 col)\$279.00
 MSP-15 (132 col)\$389.00
 MSP-20 (80 col)\$349.00
 MSP-25 (132 col)\$509.00



Prowriter 7500\$199.00
 Prowriter 1550\$449.00
 Starwriter 10-30\$459.00



Lazer LP-300\$2799.00



D25 Daisywheel\$549.00
 D35 Daisywheel\$1099.00
 D60F DaisywheelCALL



2000\$749.00



HomeWriter 10, LX-80, LX-90CALL
 FX-85, FX-105, RX-100, JX-80CALL
 DX-100, DX-20, DX-35, LQ-1500CALL
 SQ-2000, HS-80, HS-80, AP-80CALL



6000 Letter QualityCALL
 8100 Letter QualityCALL
 8200 Letter QualityCALL
 8300 Letter QualityCALL



808 Dot Matrix 100 cps\$179.00
 1080 Dot Matrix 150 cps\$359.00
 1380 Dot Matrix 150 cps\$289.00
 1385 Dot Matrix 185 cps\$339.00



8027 Transportable\$229.00
 3500 Series\$1099.00
 8600 Series\$1449.00
 ELF 380\$449.00
 Pwriter 560 24 pin\$999.00



182, 183, 192, 193, 2410, 84CALL
 Okimate 10 (Specify C84/Kan/\$189)CALL
 Okimate 20 (IBM)CALL



KX1081\$259.00
 KX1092\$399.00
 KX1093\$479.00



Quadjet\$379.00
 QuadjetCALL



500 Letter Quality\$279.00
 550 Letter Quality\$419.00
 770 Letter Quality\$759.00



SB/SD/SRCALL
 Powertype Letter QualityCALL

T1895\$529.00
 T1865\$639.00
 T1865\$759.00

1340 (80 Column)\$479.00
 P341 (132 Column)\$999.00
 P351 (132 Column)\$1099.00

CALL TOLL-FREE

IT'S NOT HOW HARD YOU WORK. IT'S HOW MUCH YOU GET DONE.

There's an odd contradiction built into most database software. Most of the features that make it powerful enough to do the job make it a real struggle to use.

But at Microrim,* we've never thought it makes sense to do things the hard way. That's why we're introducing R:base™ 5000. With a brand new feature that lets you create programs up to ten times faster.

attached chart. If you've never programmed before, these automated steps can make all the difference between getting the job done and giving up completely. And if you're an experienced programmer, the Application Express can give you ten to one productivity gains. Of course, R:base 5000 also gives you the powerful procedural language and report writer it takes to create highly customized applications.

SEE FOR YOURSELF:

1-800-547-4000.

If you believe in common sense as much as we do, you won't take our word for it; you'll get your hands on a copy and make up your own mind. And that's just what we'd like you to do. For only \$9.95 (plus shipping) we'll send you a mini-version of the product that lets you build real-life applications.

Just call 1-800-547-4000 and ask for Dept. 895. From Oregon, or outside the U.S., call 1-503-684-3000, Dept. 895. We'll send your copy right out. If you'd like to see R:base 5000 today, head straight for a leading software store or computer dealer. If you own R:base 4000, ask your dealer for a trade-up kit.

We'll show you how easy it is to get a handle on your workload. When you've got a program that does things your way.



CLIENT DATABASE MENU

- 1 Add a client master list
- 2 Change a client master record
- 3 Delete a client master record
- 4 Print client report
- 5 Exit.

PRODUCTIVITY:

R:base 5000 vs. dBASE III

Using R:base 5000 and dBASE III.™ we built this menu and linked it to its sub-routines. The resulting applications were equivalent. The effort required wasn't.

	R:base 5000	dBASE III
Keystrokes	434	6538
Command Lines	67	244
Automated steps	37	0
Time*	9 minutes	2 hours

**Your actual time may vary depending on skill level*

THE APPLICATION EXPRESS.™ WHAT A DIFFERENCE.

Since the Application Express automatically generates programming code, it can give you the tremendous advantage we've documented in the

R:BASE 5000

FROM MICRORIM

IT ALL COMES DOWN TO COMMON SENSE.



COMMON SENSE IN DATABASE MANAGEMENT
NUMBER ONE IN A SERIES.

on service because of the low price!

Jan. 14, 1986



COMPAQ®

COMPAQ® PORTABLE

256K, 360K floppy, 10MB hard drive **\$2495**

256K, 360K floppy, 20MB hard drive **\$2650**

COMPAQ® DESKPRO

256K, 360K floppy, 10MB hard drive, Compaq duo mode monitor **\$2695**

256K, 360K floppy, 10MB hard drive 10MB Tape back up, duo mode monitor **\$3195**

For 20MB Systems add \$200**

COMPAQ® 286 COMPUTERS

Compaq Desk pro 286, 640K 1.2MB floppy, 42MB Priam hard drive **\$5295**

Compaq Desk pro 286, 640K, 1.2MB floppy, 59.8 Priam hard drive **\$5495**

Compaq 286 Portable, Call for Custom Configurations

TURN 1 IBM-PC INTO 4

Turn your IBM PC or XT into a true Multi-user system with Multi-PC. Up to 4 users can share a single PC, running the same or different software all under PC DOS. Ideal for the small office. **Call for low price.**

INTERNAL HARD DRIVES FOR IBM PC AND XT

Internal 1/2 height hard drive, complete with controller card, ready to install. 1 year warranty.

10MB **\$395.00**

20MB **\$495.00**

ALPHA "TOP RATED" 49.95
ASHTON TATE
D base II 259.95
D BASE III Call
Framework II Call

BORLAND 59.95
Turbo Lightning 36.50
Turbo Pascal 3.0 29.95
Side Kick (protected) 44.95
Super Key 36.50
Turbo Pascal w/6807 support 57.95
Reflex 59.95

BREAKTHROUGH
Time Line Project Mgr. 239.00
Time Line Project Mgr. 2.0 289.00

COMPU TECH
New! Pony Express XL 149.95

FISCHER INNIS
Watchdog Security Program 239.95
(Requires hard drive)

FOX & GELLER
Quickcode III 149.95
Quick Index 89.95
Quick Report 149.95
Dutil III MD Base III 49.95

FUNK SOFTWARE
Sideways 30 39.95

GNP
CPA+ 349.95

INFOCOM
Cornerstone 259.95

INNOVATIVE SOFTWARE
Smart Software System 449.00

KOALA
Executive Presentation 95.00

LIFE TREE
Volkswriter Deluxe 159.95

LIVING VIDEOTEK
Think Tank (req. 256K) 99.95
Reedy 59.95

LOTUS DEVELOPMENT CORP.
Lotus In store only

MECA
Managing Your Money 99.95

MENLO PARK
In Search 299.95

MICRO PRO
Wordstar Pro Pack 239.95
Wordstar 2000 239.95
Wordstar 2000 Plus 299.00

MICRORIM
R Base 5000 339.95
New! Clout 2.0 139.95

MICROSOFT
Chart Call
New! Flight Simulator 34.95
Multiplex 119.95
Word 2.0 249.95
Project Call
Access Call

MICROSTUF
Crosstalk XVI 3.6 99.95
Remote 109.95

MONOGRAM
Dollars and Sense w/forecast 109.95

MULTIMATE
Multimate Version 3.3 229.95
Multimate Advantage 287.50

NANTUCKET
Clipper ID Base III 394.95

OFFICE SOLUTIONS
OfficeWriter/Speller 249.00

PETER NORTON
Norton Utilities 3.0 49.95

POWER BASE SYSTEMS

Power Base 2.1 199.95

SSI

Word Perfect Vers. 4.1 229.00

STARBRIDGE TECHNOLOGY

Sterbridge DOS 39.95

THE SOFTWARE GROUP

Enable Vers. 1.1 319.95

VM COMPUTING

Relay Communication 99.50

WARNER SOFTWARE

Desk Organizer 59.95

ZSOFT

PC-Paintbrush 59.95

QUATERDECK

Desq 129.95

ROSESOFT

Prokey 3.0 89.95

SORCIM

Supercalc 3 Release 2 189.95

Super Project 199.00

SOFTWARE PUBLISHING

PFS FILE 84.95 PFS Graph 84.95

PFS Report 79.95 PFS Write 84.95

Harvard Total Proj. Mgr. 294.95

IBM PCjr. CORNER

KOALA Koala Pad Touch Tablet for PCjr. with software 134**

TECMAR PCjr. Captain 128K w/Parallel Port 129**

47st. Computer

Computers and Business Equipment

67 W. 47th St. • 115 W. 45th St.
NYC CA LIC. # 800189 / 691865 NYC CA LIC. # 800191

116 Nassau St.

Near City Hall and the World Trade Center
Computer Annex around the corner, 39 Ann Street

Mail Order Address: 36 E. 19th St., New York, N.Y. 10003

IN NEW YORK STATE CALL **1-212-260-4410**

TOLL-FREE OUT-OF-STATE **1-800-221-7774**

NASSAU STREET STORE

1-212-608-6934

45th and 47th St. STORES

1-212-398-1410

Store Hours: Sunday 10-4, Mon. thru Thurs. 9-6, Friday 9-2

- No surcharge for credit cards
- Prompt and efficient service
- Knowledgeable and experienced sales staff.

We accept MC, Visa, American Express & personal checks (no delays if approved). Minimum shipping and handling \$5.95. Software found to be defective will be replaced immediately. Defective hardware will be repaired or replaced at our discretion within the warranty period of manufacturer. Defective items must be sent to 36 East 19th Street, New York, N.Y. 10003. AIT: Service Dept. Prices herein are for mail and phone orders only. Store prices may differ. Some items are subject to availability. Due to manufacturers price fluctuations, the prices may change beyond our control. This ad supersedes all previous PC ads. Not responsible for typographical errors.

Keep in touch with the latest items on the market and our up-to-date sale prices by checking our weekly ads in the National editions of the N.Y. Times and Wall Street Journal.

IBM® is a registered trademark of International Business Machines Corp.
Compaq® is a registered trademark of Compaq Computer Corp.

Jan. 14
Sub. Nov. 14

Where you don't have to sacrifice

HARDWARE

DISK DRIVES

TANDON TM-100-2 DS/DD
disk drive104.95
TEAC 55B 1/2 Height DS/DD
disk drive 55B96.50

HARD DISK DRIVES FOR IBM



**HIGH SPEED
INTERNAL HARD DRIVES
FOR IBM AT**
Complete with software,
Mounting rails & Instructions.
30Msec Average Access Time.
ID-40AT 51MB
(42MB formatted)**\$1295**
ID-80AT 72MB
(56.8MB formatted)**\$1495**

**PRIAM
HIGH SPEED INTERNAL
HARD DRIVES FOR IBM XT
with CONTROLLER**
51MB
(42MB formatted)**\$1495**
72MB
(56.8MB formatted)**\$1695**

INTERDYNE
Internal 10MB tape backup
for IBM PC/XT**\$95.00**

IONEGA BERNOLLI BOX
New! Dual 20 40MB**\$695.00**
20 MB (2-10 MB in cabinet)**\$389.00**
FIXT Autoboot ROM I/O only 89.95

RODIME
10MB 3 1/2" shock mounted hard drive,
Complete with controller**\$19.95**

TALLGRASS
Hard drive sub system with backup.
New! 70-5025**\$267.50**
Includes interface card for IBM-PC

TAPE BACK UP SYSTEMS
Eaves 4560 Internal (xt, at)**\$95.00**
Tacom QIC 60H
External (xt, at)**\$149.50**

DISPLAY CARDS

AST
Preview**\$269.00**
EVEREX
Graphics Edge**\$295.00**
Edge**\$299.00**

HERCULES
Color Card**\$159.95**
Graphics Card (Mono)**\$309.95**

PARADISE
Modular Graphics Card**\$259.95**
SIGMA
Color 400T / iTaxan 440/540**\$499.00**
Color 400 / iPrinetics SPS-12**\$499.00**

TECMAR Graphics Master**\$469.00**

MEMORY EXPANSION CARDS

AST RESEARCH
AST 6-PACK PLUS 64K**\$229.95**
AST 6-PACK PLUS 384K**\$239.95**
For game port option add \$4.95
INTEL
Above Board*In Store Only*
ORCHID TECHNOLOGY
Conquest (EMS) 8K with parallel/
serial and clock**\$279.95**

PC Turbo-186 w/Daughterboard \$579.00
PC Turbo-186 w/Daughterboard
& 8087* support board**\$749.95**
* 8087 optional

QUADRAM QUADBOARD
New! Expanded Quadboard
64K**\$209.95** 384K**\$219.95**

TALLTREE SYSTEMS
J RAM-2 w/parallel, serial &
clock OK**\$249.00**
New! J RAM-3 256K**\$269.00**
For per. sar. clock add \$120

TECMAR
CAPTAIN-64K**\$194.50**
CAPTAIN-384K**\$209.95**

**MEMORY EXPANSION CARD
FOR THE IBM AT**
TALL-TREE, TECMAR,
QUADRAM, AST*Call*

INTEL
Above Board for AT*In Store Only*

64K Memory Upgrade Set*Call*
256K Memory set**\$44.95**
Intel 8087-3 for PC**\$9.95**
Intel 80287 for AT**\$179.95**

LOCAL AREA NETWORK

AST
AST PC Net Starter Kit**\$795.00**
AST PC Net II Starter Kit**\$795.00**
QUADRAM
Quadnet IX Master Kit**\$1195.00**
Quadnet IX User Kit**\$599.00**
Quadnet IX Wire Center**\$299.00**

MODEMS

ANCHOR AUTOMATION
Volkmodem 12 RS-232**\$179.95**
Cable for PC, Compaq**\$11.95**
HAYES
Smartmodem 1200 RS-232**\$389.95**
Smartmodem 1200B**\$359.95**
With Smartcom II**\$359.95**
Smartmodem 2400 Baud**\$579.95**

NOVATION
1200 + Internal Modem**\$329.95**
1200 + External Modem**\$329.95**
Novation 2400 Modem**\$499.95**
Includes Mita software

QUADRAM
Quadmodem II w/Crossstalk
XVI 300/1200**\$299.00**

VEN-TEL
PC 1/2 Card Modem (Internal)
w/Crossstalk XVI**\$369.95**
1200 Plus-External 300/1200**\$369.95**

MONITORS

PRINCETON
HX-12 RGB Color**\$449.95**
MAX-12 Amber TTL**\$179.95**
SR-12**\$79.00**
SR-12 w/Scan Doubler**\$79.00**

QUADRAM
Amberchrome 12" Amber**\$149.95**

TAXAN
New! 540**\$499.00**
121-12" TTL**\$139.95**
121-12" TTL**\$149.95**

AMDEK
600 Color RGB**\$399.00**
710 Color RGB**\$439.95**
New! 722 Color RGB
(for EGA card)**\$499.95**

LASER PRINTERS

APPLE Laserwriter*Call*
HP Laserjet*Call*

IBM® HARD DRIVE SYSTEMS

— FREE —

90-DAY ON-SITE SERVICE
PLUS ALPHA KEYWORKS WITH
IBM PC & XT WITH 10 OR 20MB
HARD DRIVE SYSTEMS
Total Value! **\$2391**

IBM PC SYSTEMS

• IBM PC 256K • 10MB internal
hard drive • 360K floppy drive
\$2095

• IBM-PC 256K • 360K floppy
• 20MB Hard Drive
\$2250

IBM XT SYSTEMS

• IBM XT 256K • 360K floppy
• 10MB VI hard drive.
\$2295

• IBM XT 256K • 360K floppy
• 20MB hard drive
\$2495.00

• IBM XT 256K • 360K Floppy
• Priam 42MB Hard Drive.
\$3350



IBM AT SYSTEMS

• IBM AT 512K • 1.2 MB drive
• 20 MB hard drive
\$3895

• IBM AT 512K • 1.2 MB floppy
• Priam 42MB hard drive.
\$4595

• IBM AT 512K • 1.2MB floppy
• 59.8MB Priam hard drive.
\$4850

PLOTTERS

SWEET-P 6-pin plotter**\$795.00**
SWEET-P 1-pin plotter**\$295.00**

FLOPPY DISKS

	\$/SD	\$/DD
KODAK 5 1/4" (no pk.)	13.50	17.50
IBM 5 1/4" (no pk.)	26.95	26.95
MAXELL 5 1/4"	13.95	17.95
FUJIFILM 5 1/4" (no pk.)	14.95	17.95
POLAROID DS/DD	14.95	14.95

For quantity prices, please call

PRINTERS

BROTHER
HR-15 17 CPS**\$369.00**
HR-25 23 CPS**\$479.00**
HR-35 38 CPS**\$749.00**
Tractor Feed IHR-15, HR-25**\$124.95**
Sheet Feeder HR-15/25**\$199.95**

COMDEX
CR-3 23 CPS parallel**\$399.00**
CR-IV 38 CPS parallel**\$589.00**

EPSON
CALL FOR OUR LOW PRICES.
JUKI
6100 16 CPS Parallel Letter Quality**\$630.40**
6300 40 CPS

NEC
P-560 24 pin dot-matrix**\$999.00**
8850 letter quality*Call*
3550 letter quality 33 CPS**\$999.00**
NEC ELF-360**\$115.00**

OKIDATA
Call us for our low prices
on all OKIDATA printers.

PANASONIC
KXP-1091 • KXP-1092 • KXP-1093
KXP-3131 • KXP-3131
Call for our low prices!

SILVER REED
EXP-550 19 CPS**\$409.95**

EXP-770 36 CPS**\$799.95**
Tractor Feed for EXP-550**\$124.95**

TEXAS INSTRUMENTS
855 with Tractor Feed**\$79.95**
865 with tractor**\$749.95**

TOSHIBA
P-341**\$449.00**
P-351 (parallel/serial)**\$119.00**
P-340**\$479.95**

HARDWARE MISC.

AMERICAN POWER
300 PC**\$399.95** 330 XT**\$449.95**
450 AT**\$49.95**

DATASHIELD POWER BACK UP
PC-200 200 watts**\$295.00**
XT-300 300 watts**\$399.00**
AT-500 500 watts**\$449.00**

EVEREX
Expansion Chassis**\$99.00**

EXAN
Gems Port**\$24.95**
PK-5151 Prof. Keyboard**\$109.00**

IMSI
Mouse w/Dr. Halo II**\$109.95**

KEYTRONICS
New! KB-5151 keyboard**\$169.95**

KENSINGTON
MasterPiece**\$2.50**

KOALA
Koala Pad**\$9.95**
Speed Key System**\$9.95**

MOUSE SYSTEMS
PC Mouse with PC Paint**\$139.95**

SOFTWARE

FOR TITLES NOT LISTED
HERE, PLEASE CALL US
FOR OUR LOW PRICES.

THE RIGHT NUMBERS!

**AST
Six Pak Plus™**
w/384K **\$245**

**Dynamics
Plus**
w/64K **\$109**

Both cards include Serial, Parallel,
Clock/Calendar, Ram disk, Spooler,
& Memory



**Hercules
MonoGraphics™**
\$299

**Dynamics
MonoGraphics**
\$159

Both cards display IBM compatible
monochrome graphics on a mono-
chrome monitor

**AST
Advantage™**
w/128K **\$389**

**Dynamics
ATMF™**
w/128K **\$199**

Both cards include Serial, Parallel
Ram disk, Spooler, & Memory

IBM
**IBM PC AT
ENHANCED**

- 20 meg
Hard drive
- 512K RAM
- 1.2 MB
Floppy Drive



\$3777

286 COMPAQ

- **DESKPRO** 256K, 1.2 MEG,
20 MEG HARD DRIVE 4495
- **PORTABLE** 256K, 1.2 MEG,
20 MEG HARD DRIVE 4495
- **PORTABLE**
 - 256K, 2-360K DRIVES 1949
 - 256K, 360K DRIVE,
10 MEG DRIVE 2449
- **DESKPRO**
 - 640K, 360K DRIVE, 10 MEG DRIVE 2345
 - 640K, 360K DRIVE, 10 MEG DRIVE, 10 MEG TAPE 2940

All Models Available - C A L L

IBM
IBM PC



\$ C A L L S
For Latest Price

(We Have Your Custom Configuration)

Hard Disks

Fullly DOS Compatible. Each system comes complete
with Ready-to-Install Hard Disk, Cables, Controller,
Manual, Software, and Mounting Hardware. 1 Year
Warranty. Call for quote on larger hard disks.

10 Meg 20 Meg 30 Meg

\$369 \$469 \$669

...and More!

EPSON

389
FX 185
489
LD 1500
829

HAYES

390
1200
1200S
349

CHIPS

541
128K
294
8087
110
50287
155

ACCESSORIES

GENCO SPECTRUM 319
TEAC 360K 95
AT 360K 119

POWER SUPPLY

150W 89
125W 119

PRINTER CABLE

AT SERIAL/PARALLEL 25
EXTERNAL BOX 159
TAPE DRIVES 549
10 MEG 799
20 MEG 899
50 MEG 999

1. Call

Just call our
Toll Free Number
and tell us
what you're interested in

2. Quote

Your
Professional Assistant
will find the supplier
with the **Lowest Price**.
We'll quote the
Fully Delivered Price.

3. Delivery

Since all in - stock, we'll
ship within 24 hours.

(Overnight at Additional Charge)

For fastest delivery, send
Cashier's Check, M.O., Wire
transfer or Credit Cards. No sur-
charge for MC/VISA/AMEX and
Diner's Club at 2.5% Netex except
Texas

4. Guarantee

**Brand Name Products.
Best Price Guaranteed.**

All products carry at least
Manufacturers Warranty.
If it breaks, our technicians will
issue a return authorization. If
DOA, return for exchange. All
systems assembled and tested
before shipping.

(512) 836-5707

2201 Donley,

Suite 304

Austin, Texas 78758

1-800-535-3637

**COMPUTER DYNAMICS
INC.**

CIRCLE 490 ON READER SERVICE CARD



MAKE THE CONNECTION . . .

Our **Connection** systems will solve your problem of trying to read and write diskettes or tapes from almost any computer system using your PC.

The **Diskette Connection** is a hardware system that enables the IBM PC or compatible to read and write most 8 inch, 5¼ inch, or 3½ inch diskettes.

With our **File Connection** software programs you can transfer data files between most computer systems, including CP/M, DEC, Honeywell, Univac, IBM 3740, S/1, S/3, S/23, S/32, S/34, S/36, and S/38.

Our **Word and Typesetting Connection** programs use IBM standard Document Content Architecture (DCA-RFT) to transfer document files between most word processing and typesetting systems, including Compugraphic MCS, CPT, Displaywriter, OS/6, Multiset, NBI, Quadex, Xerox, and Wang.

Our **Tape Connection** system will read and write IBM or ANSI standard ½ inch 1600 BPI magnetic tape. A full size 2400 foot tape can store a 45 MByte file and be written in 6 minutes.

Since 1982, we have supplied thousands of systems to customers around the world, including IBM, NASA, AT&T, Kodak, and General Motors.

Our specialty is conversion systems and we can provide a solution to your problem. Call us today to discuss your requirements.

This ad is one of a series featuring NASA missions. For a free poster, send us your written request.

**Box 1970 Flagstaff, AZ 86002
(602) 774-5187 Telex 705609**

. . . FLAGSTAFF ENGINEERING

CIRCLE 180 ON READER SERVICE CARD

\$14.95
SUGGESTED
RETAIL PRICE

A NEW SOLUTION from
MicroComputer Accessories, Inc.

OPEN AND SHUT CASE.

LOCKING 50 DISK + 4 FILE

Holmes, it's criminal—these "sloppy disks" all over the desk! How can we keep them secure and dust-free and still have access to the active ones?

Mystery solved, Watson. This new 50 + 4 Locking Disk File provides a locking, smoked plastic enclosure for up to 50 5¼" diskettes, *plus* an open, up-front, instant access, swap-rack for 4 diskettes. Let me call your attention to the built-in handle, and the adjustable dividers with adhesive labels. Note the rear storage pocket for extra labels.

By Jove, Holmes, open and shut simultaneously! It's perfect for those powerful integrated, multi-disks systems—and no one's thought of it before! Holmes, you never cease to amaze me.

Elementary, my dear Watson.

MicroComputer
Accessories, Inc.



Open—swap-rack for 4



Shut—lock—50 disks for 50



Built-in carry handle

We did for Graphics what Borland did for Desk Utilities...

INCLUDES
LOTUS®
SCREEN
CAPTURE



1. Search
2. Editor
3. Radical
4. Line
5. Radical
6. Line Drive
7. Box
8. Rubber
9. Line
10. Connective
11. Boxes
12. Maker
13. Arc
14. Concomit
15. Circle
16. Circle
17. Ellipse
18. Custom
19. Apple
20. Artboard



21. Cut and Paste
22. Fill
23. Swap Fill
24. Brush
25. Fonts
26. Fill
27. Directory
28. Font
29. Printer
30. Background
31. Grid Lock
32. QuickSave
33. Patterns
34. Save/Load
35. Clip Art
36. Save/Load
37. Pictures
38. Printer
39. Exit

We made it affordable...

\$49.95

IBM PC, PCjr, XT, AT [and compatibles], 128K RAM, One Double Sided Disk Drive, Color Graphics Adapter, Graphics Monitor, Mouse or Tablet (optional), DOS 2.0 or higher

SPECTRUM HOLOBYTE, INC., 1050 Walnut, Suite 325, Boulder, CO 80302 [303] 443-0191. Check your local computer store or wherever software products are sold. Dealer inquiries call: (800) 621-6385 x262. Program by Migal, Inc. [Written by Rick Minicucci and designed by Glenn Williams.] Suggested retail \$49.95. IBM is a registered trademark of International Business Machines Corporation. Borland is a registered trademark of Borland International Inc.

TO ORDER CALL: (800) 621-6385 X262

Spectrum Holobyte



LETTERS TO PC MAGAZINE

hanced Graphics board and monitor and switching will be ancient history.

Michael Trombetta
Manhasset, New York

John Dickinson replies:

I'm glad you're enjoying the Programming columns. DOORS can easily be modified so it doesn't copy the old screen to the new one or check whether the color screen is in graphics mode. Just follow the comments in the source listing and you'll see what lines of the original program to remove. By the way, DOORS works fine with an EGA.

What's in a Name?

In the October 15th From the Editor's Screen column (*PC Magazine*, Volume 4 Number 21) Bill Machrone said he has a program from IBM called *DTREE*. I know the program he is talking about because I bought it too, but it is called *TREED*. I was mentioning this to a friend of mine and he told me about a program he uses called *Direc-Tree* from Micro-Z Co. On the disk it is called *DTREE*. He says it does a lot more than my *TREED*. Which one is Mr. Machrone talking about?

Brenda Wallen
San Pedro, California

Machrone does use TREED to get a display of his directory structure. DTREE does quite a bit more than TREED, but it's not the cheap IBM utility he meant.—Ed.

Correction

Lattice Inc.'s telephone number was incorrectly listed in "Programming Makes Sense for Business," *PC Magazine*, Volume 4 Number 22, page 152. The correct number is (312) 858-7950.

How to Write to PC Magazine

Do you have a comment, compliment, or criticism about something you've read in *PC Magazine*? A question you'd like to open up to other readers? If you can, send it on disk to Letters to PC Magazine, *PC Magazine*, One Park Ave., New York, NY 10016. We are not able to answer letters personally. All letters become the property of *PC Magazine* and may be subject to editing. We can't print letters that do not include a name and address. ■

LETTERS TO PC MAGAZINE

Am I misinterpreting the different numbers they used, or are they, in fact, in conflict with each other?

Gene Maimin
New York, New York

Winn Rosch replies:

Peter Norton's figures and mine are not in conflict. We were measuring different aspects of hard disk performance.

The speeds Norton quoted were achieved using a test that performed only sequential disk reads and did not take into consideration some important variations between hard disks. His measurements indicate only relative speeds in loading large files.

My numbers were based on average access time, the ability of a disk drive to find a random byte on the disk. My speed results are more comparable to what you should expect when performing disk-intensive chores like database sorts.

In reality, how much faster one disk is over another depends more on the kind of use you put them to. The one imaginable conclusion I would draw is that the AT's hard disk is faster than that of the XT!

Monochrome to Graphics

I enjoy *PC Magazine's* Programming columns. John Dickinson's DOORS program ("Try a Door, Not a Window," *PC Magazine*, Volume 4 Number 3) was interesting, but I have a slightly different problem. I develop graphic BASIC programs on a monochrome monitor and run them on a graphics monitor. I currently use the BASIC programs listed in the BASIC manual to switch monitors, which is troublesome, so I was hoping the DOORS program would be helpful.

Dickinson says that if the graphics monitor is in graphics mode, you don't switch back to the monochrome monitor because the mono monitor doesn't support graphics. So why bother trying to copy one screen to the other? I would be happy with a switching program that left the graphics output on the graphics monitor and allowed me to switch back to the mono monitor to continue working on my program. Is that possible?

If Dickinson intends to write such a program, he'd better do it soon, because in a few years we will all have the En-



Unprotected Software Makes the Best of Friends

The Software Industry cannot afford this kind of friendship. Estimates show that companies like yours are losing half their sales to pirates. Imagine your software sales doubling this month!

NEW

For Hard Disk Protection

- Fixed Disk Locker

For Disk Security

- High Level Security
 - PADLOCK II DISK
 - SAFEGUARD DISKS
 - COUPON DISKS

Low Level Security

- User Installable Protection
 - PC-PADLOCK

Why should your valuable data or useful software program become available in the Public Domain?



Call or write for more information.

GLENCO
ENGINEERING INC.
3920 Ridge / Arlington Hts., IL 60004
(312) 392-2492

Try It. Then Buy It. PC-Write.-

A fast, full-featured word processing package for the unbelievable price of \$10. Complete. You get a manual on disk, mail merge, split screen, keyboard macros, on-screen formatting, full printer support, and more.

Try PC-Write for \$10.

Then register for \$75 to get:

- latest diskette
- printed manual
- two updates
- phone support
- newsletter

Registration supports our "shareware" concept that keeps our prices low, and allows our development of PC-Write enhancements.

Shareware means you can get PC-Write from a friend or user group to try, and give away copies yourself. Then register if you like it. No risk!



PC Magazine
Jan 15, 1986
Read about
PC-Write in

"Word Processing Power", in this issue of *PC Magazine*. Watch for version 2.6 soon; it will have a new manual, automatic reformatting with proportional spacing, and optional easy-to-use menus.

Order PC-Write Today.
Satisfaction Guaranteed.

DeLacy
(206) 282-0452



219 First N. #224v
Seattle, WA 98109

NOW BETTER PRINT-QUALITY IS JUST A KEYSTROKE AWAY.

LETTRIX.

With LETTRIX™ your IBM ProPrinter, Epson, Okidata, IBM Graphics, Star Gemini, or Panasonic printer can print proportionally-spaced and microjustified letter-quality text directly from all software. This entire advertisement is an actual-size photograph of text printed from a word-processing program on a \$300 Epson printer controlled by LETTRIX.

Before: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef
After: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef

LETTRIX resides in memory between your software and printer, responding automatically to justification, spacing, paging, margins, boldfacing, underlining, *italics*, subscripts and superscripts. You just print as you would normally from within your word-processor.

"A fun program that is easy to use." -- PC WEEK
"The sharpness and clarity nearly equals that of an expensive daisy wheel printer." -- THE NEW YORK TIMES
"Surprisingly low price." -- BOARDROOM REPORTS

"LETTRIX is the top of its class."

-- Ronni and Harry Geist, PC PRODUCTS, August 1985

Design your own typefaces, or use the 20 included: Broadway, Courier, Old English, Art Deco, OUTLINE, EEEEEEEE, Engraved, *Park Avenue*, WESTERN, SHADOW, Roman, BANKER, Gothic, Prestige, Folio, ORATOR, OCR-A, the entire IBM mathematical/line-drawing character set, as well as Français, Español, Русский and Ελληνικός.

You can control LETTRIX features either by accessing a menu that pops-up over your current software, or by placing simple single-character commands in your text.

For fastest delivery, charge LETTRIX to your VISA or MasterCard by dialing (800) 351-4500. LETTRIX™ costs just \$98.50. We pay all shipping.

SIXTY-DAY MONEY-BACK GUARANTEE. NOT COPY-PROTECTED. Call and mention this magazine for a free print sample. LETTRIX requires an IBM PC, XT, AT, or compatible with 50kb of free memory, and DOS version 2.0 or greater.

HAMMERLAB CORPORATION 5700 ARLINGTON AVENUE
(203) 776-5699 RIVERDALE, NEW YORK 10471

CIRCLE 303 ON READER SERVICE CARD

LETTERS TO PC MAGAZINE

also recommend commercial products that can do many DOS chores for those who don't want to get the least bit technical.

We're somewhat mystified at complaints like Mr. Forbath's. While we admit that not all manuals are wonderful, the IBM DOS and Hayes Smartmodem manuals are at the top of the class. Mr. Forbath's reading the right magazine, but definitely the wrong books. He might drop whatever he's reading and turn instead to manuals such as these. (Incidentally, the best DOS book out there is the one published by Microsoft.) To learn how to both use the Hayes modem and set up batch files, try creating the DIAL.BAT batch file below, which is set up for a 1200-band Hayes or compatible modem. Be sure MODE.COM is on your disk when you try this (you can find it on your main DOS disk). You can create it using the DOS EDLIN editor or a pure-ASCII word processor. The following instructions will create it in DOS. Get into DOS and type everything exactly as shown and hit the Enter key at the end of every line, especially the last one. After the very last line, hit the F6 function key and then the Enter key. This set of instructions will create a batch file called DIAL.BAT. Use it to dial your phone (with a Hayes Smartmodem attached) just by typing the word DIAL followed by a number.

```
copy con:dial.bat
echo off
mode com1:1200 >nul
echo ATDT1: >com1:
echo pick up phone and
echo press any key to
echo disconnect the modem.
pause
echo ATH >com1:
```

—Ed.

Hard Disk Heartache

I'm confused by the statistics surrounding the speed of the AT's hard disk mentioned in both Winn Rosch's and Peter Norton's columns in your October 15th issue (Volume 4 Number 21). Rosch mentions that the AT's hard disk speed is "two to three times faster than an ordinary hard disk like the XT's." Then Peter Norton's column rates the AT's disk at 1.6 times the speed of the XT's hard disk.

Letters to PC Magazine

Power of the Pen

In "Word Processing for the Dollar-Wise" (*PC Magazine*, Volume 4 Number 21), Phil Wiswell demonstrates an obvious bias toward *Textra* but admits that "PC-Write offers some advanced features not found in *Textra*." Of course, reviewers have favorites, but I wish Wiswell had been more accurate and constructive with his comments.

I agree the manual is poorly written and indexed. Quicksoft's rewritten manual should be included with Version 2.6.

Contrary to what Wiswell wrote, we have a printer menu program that automatically creates the printer driver file for about 160 printers.



The article's feature table was also wrong. Besides the incorrect price, the on-screen formatting data was wrong. All fonts including boldface or underlining are shown highlighted, underlined (monochrome adapter), or in colors (color/graphics adapter).

People do become attached to their word processors. Fortunately, for \$23.95 users can buy both products and compare.

Bob Wallace
Quicksoft
Seattle, Washington

Phil Wiswell replies:

I was wrong about the printer driver tables. Thanks for pointing those features out. I missed them in the manual, which, as you admit, is so poorly organized that I don't wonder why I couldn't find some things.

The status line of PC-Write is poorly de-

signed—it doesn't read well. The information I am looking for in a status line is DOS date and time, filename, drive/directory path and extension, and information concerning the status of the CapsLock, NumLock, and Insert keys. But more important than having all the information is presenting it clearly, which I don't think your product does.

PC-Write does not show fully formatted text. Yes, boldface and underlining. But what about page breaks, headers, and footers?

Sorry about the price. We had the wrong information. You are right: You can buy both for under \$25 and see which one you like, then reformat the other as a data disk.

A Beginner's Blues

I'd like to second Louie Angular's suggestion ("A Novice's Plea," *Letters to PC Magazine*, Volume 4 Number 22) that you devote a larger part of your magazine to the needs of the novice. Much of your material is over the heads of many of your readers. Unlike those of a few years ago, most current PC users are not data processing professionals and have no background in programming whatsoever.

Your statement that "everybody's a beginner—for about 20 minutes" is utter nonsense. It's very easy to be a beginner for many years. I bought myself my own handy IBM PC 2 years ago and have read everything I can get my hands on that my limited time allows. Nevertheless, I can't do any of the useful things that Louie mentioned in his letter. I can't write a batch file or an AUTOEXEC file. I have no idea how to use my Hayes modem or set up a subdirectory. I've been reading and reading a textbook on MS-DOS for over a year and haven't yet gotten to the chapter on trees.

Please help us beginners. You magazine people better do some research on who your readers are, or one day you'll find they've gone somewhere else.

Bart Forbath
Baldwin, New York

I must vigorously protest the description of your target audience as "business and professional users who are already proficient in one or more aspects of computer use . . ." printed in response to Louie Angular's letter.

You've forgotten all us underlings out here, who either have to try to catch up with the boss or who've moved from a noncomputing to a high-tech office. As a former computer hayseed, I survived by asking a sympathetic programmer in another department about terms like batch file, warm boot, or time-out; terms that my own staff blithely tossed off. I read *PC Magazine* for survival then; I read it for sheer interest now.

You've got such a nice, thick magazine, couldn't you consider putting in one two-sided article? A heading scrawled in crayon; titles like "Buzz Words"? I consider myself pretty proficient, but I have a sneaky feeling that I've anthropomorphized a few functions, and at this point I'd rather die than ask someone to explain some of the more elementary points of operating systems.

Terry Carpenter
Wilmette, Illinois

We have surveyed our readers, and the overwhelming majority of them are businesspeople and professionals who already know the basic ropes. We won't waste their time (and ours) by publishing articles that say: "This is a floppy disk. You can store information on it."

"Beginner" after 2 years is a contradiction in terms. Personal computing is not brain surgery. Our popular productivity columns like User-to-User, Power User, PC Tutor, and Spreadsheet Clinic offer an extraordinary treasure house of hints and tips that will help catapult anyone from the shaky intermediate level to the power user stratosphere. And we're reviving up a new column, called PC Lab Notes, which may be just what you're looking for. It will step users through the intricacies of DOS so they can learn how to really master their systems, and it will

WHOLESALE CASH PRICES

CASH, MONEY ORDER, CERTIFIED CHECK, WIRE TRANSFER, PERSONAL CHECK



2400 BAUD
MODEM

CASH PRICE
\$439

YOUR
CHOICE

- FUJITSU 1935D
- US ROBOTICS COURIER

HARD DISK KITS FOR THE IBM PC/XT

	INT.	EXT
10 MB	\$359	\$545
20 MB	\$459	\$645
30MB		
40 MB	CALL	FOR BEST PRICE

Kits include hard disk, cables, controller, mounting hardware

Power Supply for PC/XT

130 Watt	\$89
150 Watt	\$119

HARD DISK KITS FOR THE "AT"

20 MB	\$475
(Less than 40MS access)	
20MB - 40MS access	\$649
30MB - 40MS access	\$849
40MB - 40MS access	\$950
70MB - 35MS access	\$1995

Up to 170MB available

INTEL MATH CO-PROCESSORS

8087-3 IBM PC/XT	\$109
8087-2 AT&T, COMPAQ	\$139
80287-3 IBM AT	\$189

MEMORY

64K 150NS	.99ea
128K-150NS (IBM "AT")	\$4.99
256K-150NS	\$4.49

MODEMS

HAYES 1200 EXT.	\$369
US ROBOTICS PASSWORD	\$189
COURIER	\$439

TAPE BACK-UP

INTERDYNE Internal 10MB	\$395
20MB Internal	CALL

ACUMEN AT

*MHZ 80286
*12 Slots
*12 Meg Floppy
*640K installed
*234 Watt Power Supply
*50% Faster than IBM AT
*U.S. Made

\$1995

ADD IN BOARDS

Multifunction

AST 6 PACK/384K	\$259
AST ADVANTAGE	
w/128K	\$389
T/S 384K	\$195
ORCHID BLOSSOM OK	\$179

PERFORMANCE

256K ORCHID PC	
TURBO 186	\$579

MONITOR ADAPTORS

HERCULES GRAPHICS	\$289
HERCULES COLOR	\$149
T/S GRAPHICS EDGE	\$1995

CASH PRICES ON HARD DISK KITS

20 MB
\$459



70 MB
\$1995

CALL TOLL FREE 800-648-0613 IN ILLINOIS, CALL 312-832-2733

tele-solutions

TERMS: CERTIFIED CHECK, MONEY ORDER, VISA, MASTERCARD AND AMERICAN EXPRESS • COMPANY PURCHASE ORDERS ACCEPTED UPON CREDIT APPROVAL • 7 DAY DELAY FOR PERSONAL CHECK • CALL FOR RMA NUMBER ON RETURN MERCHANDISE • 10% RESTOCKING CHARGE ON UNCLAIMED ORDERS • IL RESIDENTS ADD 6.25% TAX • MIN ORDER \$50 • ALL PRICES SUBJECT TO CHANGE AND AVAILABILITY OF PRODUCT



490 W. Wrightwood Ave., Elmhurst, Illinois 60126

CIRCLE 161 ON READER SERVICE CARD

"I Program In BetterBASIC And I Recommend It"

Neurometrics, Inc. Lifescan (tm) brainwave monitor required an optional module that would allow anesthesiologists to perform enhanced data analysis using PCs. Because source code is provided for program modification, BASIC was selected due to its widespread use. But BASIC lacked strong file management and modularity. That's when I heard about BetterBASIC. BetterBASIC gave me the file management and modular features needed to break my large programs into logical units. Now I program in BetterBASIC and I recommend it.

David Geving, Systems Analyst - Neurometrics Inc. - San Diego, CA

640K Now you can use the full memory of your PC to develop large programs.
STRUCTURED Create well organized programs using procedures and functions that are easily identified and understood and completely reusable in future programs.

MODULAR Use procedures and functions grouped together to form "library modules" which are then available to you or anyone else for future use.

EXTENSIBLE Create your own BetterBASIC modules which contain BetterBASIC extensions. This feature coupled with the easy-to-use Assembly Language support, makes this an ideal OEM language.

INTERACTIVE BetterBASIC acts like an interpreter because it responds to the users' commands in an immediate mode. However each statement is actually compiled as it is entered.

COMPILED Each line of the program is compiled as it is entered into the computer's memory rather than interpreted at runtime.

RUNTIME SYSTEM The optional Runtime System generates stand alone EXE. files allowing for the distribution of products



written in BetterBASIC with no royalties.

SUPPORTS Windows, Graphics, DOS and BIOS ROM calls, Chaining, Overlays, Local and Global Variables, Recursion ... and more.

BetterBASIC Runs on IBM PC, XT, AT and all IBM-compatibles. Ask your local dealer for BetterBASIC or call 1-800-225-5800 in Canada call 416-469-5244. Also available for the Tandy 1000, 1200, AND 2000 AT Tandy/Radio Shack stores.

Summit Software Technology, Inc.™

P.O. Box 99, Babson Park
Wellesley, MA 02157

PRICES:

BetterBASIC	\$199
8087/80287 Math Module	\$99
B'Trieve™ Interface	\$99
Runtime System	\$250
Sample Disk with Tutorial	\$10

Better
BASIC.

Because It's The Best.

CIRCLE 214 ON READER SERVICE CARD

MasterCard, Visa, Checks, Money Order, C.O.D. accepted and P.O. on approval.

BetterBASIC is a registered trademark of Summit Software Technology Inc. IBM PC, XT, AT, are registered trademarks of International Business Machines Corp. Tandy is a registered trademark of Tandy Corp. B'Trieve is a registered trademark of SoftCraft Inc.

(If you're using BetterBASIC and would like to be featured in one of our ads, please write to the Director of Advertising at Summit.)

ed over the years. It has to toggle back and forth between insert and overstrike modes. It has to set the margins, tabs, and line spacing. It has to be able to summon help. How many ways should it take to save a

file? Or start a new one? Similar rules govern other software categories. Let's pick one intuitive keystroke for each basic activity and chisel them all in stone.

What this industry really needs is a 5-

cent set of minimal standards. A digital lingua franca. Every applications package should come with an installation program that lets users set up the program in one of three configurations: the way the manufacturer recommends, the customized way the user eventually feels is best—or most important, the 5-cent standard way, so that first-time users who knew the universal commands could scope out the software.

Printer Boss™

SIMPLY THE WORLD'S BEST PRINTER UTILITY!

The all-new Printer Boss uses machine-level source code to give you superior operation, command-line input option, dazzling font design features and much, much more. Now you can take full advantage of the capabilities you paid for in your dot-matrix printer, on one plain-English menu, at the touch of a few keys. And everything can be controlled from an AUTOEXEC BAT file! No other program gives you all these features.

Custom font design

- Draft mode 8x11 dots/char
- Quad density 16x24 dots/char
- LO-1500 24x9 dots/char
- LO-1500 24x29 dots/char
- LO-1500 24x37 dots/char
- Graphics mode screen display
- Single-key current character test print
- Custom font loading from menu
- Unlimited custom font library

Choice of character sets

- IBM Matrix character set
- IBM Graphics 1 character set
- IBM Graphics 2 character set
- IBM Screen character set
- IBM APL set
- Graphics characters link vertically
- Simulated download: MX, RX, etc

Supports pathnames

- Configuration, font and print files

Printer format control

- Eite, compression, enhanced, etc
- Line spacing
- Right & left margin
- Set form length lines & inches
- Set undirectional printing
- Set half-speed & proportional printing
- Select 9 Epson language sets

Letter quality graphics printing

- Double density graphics
- Quad density graphics

RAM printer buffer up to 32K

- Buffer on/off control
- Print current buffer control
- Abort current buffer control

Command line printer control

- Autorec: last file operation
- Unlimited stored settings recall

Unlimited menu setting storage

- Single-key reset to default settings
- Configuration file settings storage

Sideways printing

- Menu selection of 6 font sizes
- Full 256 character fonts
- Sideways font design
- One-piece "glued" spreadsheet output
- Character & line spacing control
- Left margin control
- Top & bottom margin control
- Paper width choice: 8" or 15"
- Doublestrike option
- Printer selection from menu
- Menu printer port selection
- Commands independent of Lotus version
- Spreadsheet page setting constant
- Requires input of # of rows ONLY
- Avoids user calculation of "guesses"

Special features

- Typewriter output mode
- Printer setup string feature
- Custom logo design
- Pop-up printer control feature
- Print direct from word processor
- Supports function keys
- Master select code feature
- Enable Epson NLO option
- Directory default change from menu
- Drive default change from menu
- Indicates unavailable options
- Single-key sample print routine
- Printer selection from menu
- Mouse software interface
- Help screens
- Single menu, all features

For the IBM-PC, PCjr, XT, AT and all compatibles with 128K RAM and one double-sided drive using PC-DOS 2.0, 2.1, 3.0 or equivalent. For the Epson and IBM dot-matrix printers and all compatibles. Printer Boss protected \$139.95, unprotected \$169.90. VISA, MC or send money order or check. Company purchase orders accepted. Shipping \$4.00 per package, COD add \$2.00. Outside USA \$15.00. Dealers welcome. Free info.

CONNECTICUT SOFTWARE SYSTEMS
30 WILSON AVENUE
ROWAYTON, CT 06853

INFORMATION

203-838-1844

ORDERS

800-321-0409



Connecticut Software

CIRCLE 175 ON READER SERVICE CARD

The only real standards are the de facto hardware ones created by IBM, and those change slightly with each new generation of equipment. But no one has been able to standardize software.

Sure, differences are important. I like command-driven programs; you may prefer software with menus. Actually, programs should have both so that infrequent users can stumble their way through while power users can stomp on the accelerator. The differences between similar packages should be in the number and power and versatility and speed of features, not in the actual commands that execute them.

The only real standards are the de facto hardware ones created by IBM, and even those change slightly with each new generation of equipment. But no one has been able to standardize software. IBM has produced or endorsed half a dozen different word processors for its micros, each different in operation; presumably it'll keep doing so until it gets it right. If even Big Blue isn't capable of doing something as trivial as maintaining F1 as the help key, we're all in for a rocky ride ahead.

The computer industry has already creamed the market of patient, intelligent, pioneering users who are willing to suffer the arrogance and mediocrity of perverse software designers. If the industry really wants to expand its market, it's going to have to set some simple usage standards, and live by them. Otherwise we'll be laughing—and some of us crying—for years to come.

Substandard Brands

You can't always get what you want. With software, you can't always get what you need, either. Especially if you get stuck with a loser like the one described below.

This is a true story. Cross my heart. The patsies who have already purchased the particular product will back me up. The rest of you should go out right this minute into the nearest woods and cut yourself a pole slightly longer than three meters and be sure to carry it in front of you the next time you walk into a software store.

As I write this, *PC Magazine* is putting the finishing touches on a fat blockbuster word processing issue in which we torture-test every last editing package on the market. Special-projects editor John Dickinson, who is running the event, has issued each of his software inquisitors a massive 400-item questionnaire to help comb out the good and bad points. John likes to be thorough.

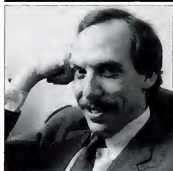
This morning he staggered into my doorway, half convulsed with laughter, glasses propped up on his brow, wiping away a tear with the back of a hand that was wrapped around one such test result. As he fought for his breath, he read one of the findings aloud:

"Unfortunately, in the name of optimization, this package has ignored the keyboard conventions, using the large Plus key on the numeric keypad as the Execute or Enter key. PgUp as the PgDn key. Home as the PgUp key, and number 5 as the Home key . . ."

The only problem is that while this is hilarious, it isn't the least bit funny. Some poor yob who doesn't read the review will walk out of a computer store with this software under his arm, boot it up, manage to crank it into gear, and go apoplectic as he despairingly chases these "optimized" key functions around the cursor pad.

Software today is a crime. The only standardization is that there are no standards. Until he spends the hours required to master a whole new slate of unintuitive commands, a power user who is a black-

belt virtuoso on one word processor is a fumbling bumpkin on another. Such confoundingly unique sets of commands make it impossible to visit your dealer and test-drive a hot new product. But that's probably the way insecure software manufactur-



Paul Somerson

ers want it. They cringe at the thought that their customers might plunk themselves down before a coworker's terminal and see in an instant how far superior another product is. Of course, this is tough to do if you can't even figure out how to get someone else's software to start.

Few software vendors ever want to admit that a competitor's user interface is best. It's the wild West all over again. "My standard is better than your standard." "Oh yeah? Says who?" "Draw . . ." It's software anarchy out there. And the situation isn't helped when companies like Apple sue companies like Digital for trying to maintain even a pitiful standard like the Macintosh's.

Imagine if car manufacturers had equally little sense. I can picture a roomful of doughty overpaid automobile executives planning such a new product. One chomps down hard on a thick stogie and leans back

in his chair. "I'm tired of watching some hi-tech college boys set all the rules," he exhales between clouds of acrid blue smoke. "We're gonna revolutionize the business. You know, some airline pilots and old-time drivers steered with their feet, so I think we'll adopt this technique in our new model—it'll help define it as a classic. And, once you think about it, it makes sense to control speed with what used to be the steering wheel, since the turning of a control screw is the perfect . . . paradigm for acceleration; the more you turn it, the more gas we feed into the engine. And the brake should be up by the new accelerator wheel; we'll put it where the directional signal used to be. And we'll move the directionals down to the floor so the right foot can signal right and the left foot left . . ."

Can you picture the mess that would result on the roads?

But some real-life software engineer actually thought it would make perfect sense to have the PgUp key do a PgDn—and he put his money where his mouth was. (And this was far from his only transgression. The review also noted that the program couldn't easily delete by word, or move to the top or bottom of a document, or jump from one end of a line to the other without requiring an annoying thicket of keystrokes. Its insert function caused nearby chunks of text to "disappear temporarily." And since the program did not create backup files, but in some madcap "recovery" scheme instead captured keystrokes for later reconstruction, delays were rife—single-character deletions took nearly a second. Each. But this is why we review products for you—to spare you this, and steer you instead to the winners.)

Every word processor has to offer some very fundamental features. It has to open files and save them. It has to move the cursor around the screen, using the keys IBM's human-factors people have perfect-

Introducing In·a·Vision

Complex Drawing Made Easy

We created In·a·Vision just for you. The engineer who needs more productive drafting support. The designer who needs versatility for alternate ideas or quick revisions. The architect who needs to manage a variety of working drawings. And the businessman who needs first-class presentation materials as well as detailed flow charts and organization charts.

Point. Click. Draw.

Now all you do to create complex technical drawings, systems designs, blueprints, diagrams, illustrations, and proposals is point,

click and draw. With In·a·Vision's mouse support, windowing, icons, and pull-down menus, you produce drawings more quickly, accurately and efficiently than ever before.

In·a·Vision's advanced technology includes many features not found on comparable systems costing thousands more. For example,

you can pan around in a user-definable drawing space up to 68" x 68" and zoom in on specific areas for greater detail. Scale, rotate and dimension symbols, fill an area with your choices of predefined colors and patterns, as well as draw lines with multiple styles and widths. Other features include overlays, predefined and user-definable page sizes, rulers, grids, and symbol libraries.

Multi-tasking in a PC-based CAD system.

In·a·Vision uses multi-tasking to enable you to continue drawing while printing hard copies as well as edit multiple drawings simultaneously.

Unlike more expensive CAD systems, In·a·Vision is easy to install and use. Even the computer novice can be productive immediately. And In·a·Vision is not copy-protected.

Ten Day Trial Period.

We're so sure In·a·Vision will

make you more productive, we'll give you ten days to prove it to yourself. If In·a·Vision doesn't improve your productivity, return it within ten days for a full refund.

In·a·Vision will make your complex drawing tasks simple and make you more productive. Satisfaction guaranteed. Dial 800-272-3729 to order or for a free brochure. In Texas

or for customer support, call (214) 234-1769. MICROGRAFX, Inc., 1820 North Greenville Avenue, Richardson, Texas 75081.

MICROGRAFX™
The Picture of Success.

(Most popular graphics cards, plotters and printers supported.)
Microsoft Windows compatible. Call for specific operating environment requirements.

CIRCLE 312 ON READER SERVICE CARD

In·a·Vision and MICROGRAFX are trademarks of MICROGRAFX, Inc.
Windows and Microsoft are trademarks of Microsoft, Inc.

Introducing

brown bag

Software

"Your
Money's
Worth"

**The Best Word Processor
for the IBM-PC is only**

\$69.95!

**You Can Recover
Erased Files for**

\$49.95!

WE DO WORDS

Brown Bag's Software Word Processor for the IBM PC and compatibles allows you to edit two documents at the same time or edit two parts of the same document at the same time. You can choose the window size of your choice.

FREE MAIL MERGE

Brown Bag's Software Word Processor for the IBM PC and compatibles comes with Mail Merge built-in, not an expensive add-on! This allows you to send out "form letters" that insert data, names and addresses from your *benefits database*.

KEYBOARD MACROS INCLUDED TOO!

Brown Bag's Software Word Processor for the IBM PC and compatibles includes a built-in Macro Processor. This feature allows you to reassign almost any key on the keyboard to a more favored one, or to assign commonly used text, footer page, signature blocks, etc., to a keystroke. Save keystrokes, eliminate errors, increase productivity!

POWERFUL EDITING FEATURES

Like right and left justifications, global search and replace including wildcards, wrap/line, undo, block move, block copy and/or delete, word wrap, temporary and permanent margins, footnotes, headers, trailers (table lines), mixed right and left pages, page numbering option, on screen page counts and *many more!*

PRINTERS AND FONTS GALORE!

Brown Bag's Software Word Processor for the IBM PC and compatibles includes drivers for 41 types of printers, including the new *Intelligent Mailer* laser line (monochrome) and *Intelligent Mailer* (laser) color. Speaking of printing, we can print any document continuously (until you either run out of paper or terminate), a two-sided number of times or just once.

GREAT DOCUMENTATION AND TELEPHONE SUPPORT

Brown Bag's Software Word Processor for the IBM PC and compatibles comes with a 175+ page manual which includes a table of contents, index and glossary. For those "Traction Types," we've also included a complete telephone section. A limited amount of free telephone support is included for registered owners of this package only. Additional telephone support is available at a rate-based charge. This additional support is offered to Visa or Mastercard. Support is available Monday through Friday 9 A.M. through 5 P.M. Pacific Time. Normal business holidays excluded.

COMPATIBILITY

IBM PC, and most compatibles including XT, AT, 88 Chipsets, Tandy PCs, Eagle, etc. 128K of memory is required. Monochrome display, single color, or multi-color mode, pick your own colors, or use our defaults. 24 editing lines. Use your money word processor file, text Prepress's 4 double-sided floppy disk drive. But *many* features, so it runs on hard disks, and will use DOS 2.0 or greater and directory commands and path names.

YES YOU CAN RECOVER ERASED FILES

Even... With Brown Bag's Software File Recovery System for the IBM PC and compatibles, no programming experience required. If you can erase a file, you can restore it!

MENU-DRIVEN and "FOOL-PROOF"...

Do you have one of those "in your office, we do not" that's precisely why we developed Brown Bag's Software File Recovery System for the IBM PC and compatibles! Our menu-driven system is a snap.

FIX A DAMAGED FILE TOO!

Sometimes files can get "glitched," by a power spike, bumping into the hard disk, dropping the computer on the floor, etc. We understand. That's why we've included a full screen editor to repair any spot in any file, hidden or otherwise.

IS IT HARD OR FLOPPY?

We don't care. We work with floppy disks, most hard disks, and most IBM PC compatible computers. And we are not copy protected.

HELP IS ONLINE TOO!

We know that most people don't read manuals. (But we include a comprehensive one anyway.) And when you erase a file and need it recovered NOW, you're not in any frame of mind to pore through any manual. We understand. That's why we've just been building online. Just hit the F key and the help appropriate to where you are and what you want to do is immediately available. The only thing better would be two apps!

OTHER HANDY TOOLS... HELP, WHERE'S THE FILE GO?

We provide menu-driven tools to change a file's attributes, change disk labels, modify screen color, locate a lost file that you know is somewhere on the disk, but it's lost in a maze of sub-directories (you forgot which).

To Order: CALL NOW

408-395-9568

**24 Hours A Day, 7 Days A Week
Have Your Credit Card Handy**

CIRCLE 127 ON READER SERVICE

TRY IT FOR \$5.00
CALL NOW... NOT A DEMO

DOWNTIME by WINN L. ROSCH

Data Cassettes Challenge Cartridge Backup Systems



The humble audio tape cassette can teach us all a lesson in perseverance. From an inauspicious beginning about 20 years ago as a mere convenience for transcribing the human voice, it has evolved into the world's most popular high-fidelity music medium. Once barely capable of the sound quality of a telephone, the audio tape cassette now outsells the venerable vinyl record.

With the fresh incursion of cassettes into the realm of hard disk backups, history stands to repeat itself. If the latest cassette-based backup systems are any indication of what's to come, the cheap plastic tape packs will probably soon take over as the premier personal computer backup medium.

Before reading further, trash any thoughts of backing up by plugging your dictation machine into the cassette jack on the back of your PC (a connector not available on XT's and AT's).

The new cassette systems use a completely different connection to link up to your computer. The systems also use a novel tape transport design and special cassettes.

These differences are both justifiable and worthwhile. The capacity of the most common new-style data cassette (alas, ordinary audio cassettes will not work in the new systems) is about 20 megabytes, and 30-megabyte cassettes are now becoming available. The speed at which all that vacant space on a tape can be filled is higher than that of the most popular full-size PC-style streaming tape backup systems. In my tests, I packed 12 megabytes of hard disk files onto a cassette in 3 minutes, a 4-megabyte-per-minute rate that

beat my previous cartridge tape backup record by two to one.

Twins Under the Skin

Two harbingers of the happiness of cassette-based backups have thus far crossed my doorstep: the Genoa Galaxy 3220T and the BackPac 25+.

The Genoa appears aimed at legitimizing the cassette as a genuine backup option. The only difference between it and Genoa's conventional 1/2-inch tape streamer is the tape transport itself. The packaging, software, and installation are identical no matter which tape technology you choose.

The BackPac could be viewed as either a step forward or a step backward. But even the backward step—its drive packaging and concept are reminiscent of computer cassettes of old—seems to be in the right direction. The external hardware package is about the same size as the typical 5-year-old, pre-Walkman portable cassette recorder, and its design intent leans in the same general direction—portability. It even has a handle.

Despite their obvious outward differences, the two systems bear strong similarities just beneath the surface. Both are based on the same high-density computer tape cassettes, and both use the same TEAC Corp. of America tape transport. Both systems require you to plug the same host interface card into one of the expansion slots of your PC, XT, or AT, and the cards used by each system both bear the name Genoa. The software for both systems has the same uncanny similarity, the only apparent difference being the name in the copyright notice. Obviously, then, both sys-

tems should earn the same marks, high or low.

They do. I was impressed by both of them. Not just by their speed and capacity but also by their almost elegant design, sturdy construction, and generally smooth operation.

Superlative Software

The strength of both systems relies as much on the software as the clever cassette adaptation. The speed is won by clever programming that replaces the standard IBM BIOS (basic input/output system) routines for hard disk operations with custom-written code optimized for making disk image backups. The special code returns control to the normal BIOS when the backup is done.

The software is genuinely versatile, too. It's completely menu-driven, yet it can be command-driven by the impatient power users who prefer to communicate directly with DOS.

Moreover, the software is smarter than the average backup program. In the highest-speed mode, it makes disk image backups but copies only the active areas of the disk. During the backup process, it constructs a directory on the tape that allows individual files of a disk image backup to be restored. Unlike many cartridge-based backup programs, it even allows more than one backup session to be put onto each tape.

Alas, the competition among backup systems is fierce. How can cassettes hope to compete with the likes of precision 1/2-inch streaming tape cartridges and Bernoulli Boxes?

The answer is simple: by being cassettes and persevering. Although the media prices are

currently stiff (20 megabytes for \$29.95 and 30 megabytes for \$34.95), they are competitive with the costs of other tape formats. Take one look at one of the new data cassettes, and you know that even those prices will plummet in a matter of months. After all, cassettes don't have expensive aluminum baseplates like other tape cartridges. Moreover, the cassette capacities are just the right size—20 megabytes—for the most popular hard disks, and the new 30-megabyte tapes will hold a full DOS partition. There's no speed penalty, and cassettes are so familiar and convenient.

Both of these units prove that computer engineering doesn't stand still, and new powers can be evoked from even a venerable medium like the long-lived tape cassette. Judging from the popularity of cassettes in other places like living rooms and dashboards, the cassette is bound to be a winner when it comes to backing up, too. ■

BackPac 25+
BackPac
International
Corp.
1701 Directors Blvd.
#250
Austin, TX 78744
(512) 448-4965
List Price: \$1,295
Requires: 128K RAM,
DOS 2.0 or later.

Genoa Galaxy 3220T
Genoa Systems Corp.
73 E. Trimble Rd.
San Jose, CA 95131
(408) 945-9720
List Price: \$1,195
Requires: 128K RAM,
DOS 2.0 or later.



Leaders have always recognized good advice...

Bring your company's presentation graphics into the computer age with the best recommendation you can make: Hewlett-Packard.



Hewlett-Packard's Graphics Plotters introduce professional-quality graphs and charts to the office... quality that, quite frankly, makes the competition look stone-age by comparison.

Combine our brilliant color capability, precise line quality, and proven reliability—and HP becomes the obvious choice for your presentation graphics needs. When it comes to plotters, it's easy to see why HP has become the world's Number One recommendation.

Compare the quality of an HP Plotter...

Before making your graphics plotter recommendation, find out how HP stacks up against the competition. Here's a quick checklist:

Are the lines sharp and bold? Do they meet precisely? Are the diagonal lines smooth? Is the text easy to read?

In a chart, is the area fill uniform? With HP, the answer is always yes, yes, and...yes.

Runs with leading PCs and software packages.

HP Graphics Plotters are compatible with most of the personal computers in your office, including IBM, Compaq, and AT&T—as well as a host of HP computers. You even have a choice of many off-the-shelf software packages, such as Lotus 1-2-3[®] and Symphony[™] that give you "first-day" productivity.

Send today for your FREE sample plots—and see exactly what we mean.

Return the coupon—or call us toll-free at (800) FOR-HPCC. We'll send you a detailed brochure, a list of available software, plus sample plots from both an HP Graphics Plotter and a leading printer. Don't resort to stone-age methods before seeing the difference an HP Graphics Plotter can make. Call Hewlett-Packard today.

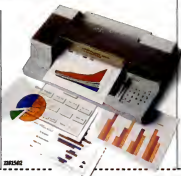
*1-2-3 and Symphony are trademarks of Lotus Development Corporation.

**Leadership in Business Graphics.
For Leaders in Business.**



**HEWLETT
PACKARD**

CIRCLE 153 ON READER SERVICE CARD



YES, I'd like to make the most informed business graphics recommendation I can. Please send me your detailed brochure, plus sample plots so I can see exactly what my company's presentations have been missing. I understand I will receive this information without cost or obligation.

Name

Title

Company

Address

City State Zip

Mail to: Hewlett-Packard, 16399 W. Bernardo Dr.
San Diego, CA 92127-3899
Attn: Marketing Communications.

11802 PM1

Framework: Even Better The Second Time Around

FIRST LOOK

BY JOE DESPOSITO

With its new modern logo and red and white colors, the packaging for *Framework II* hints at the changes made in the software inside. The new version of Ashton-Tate's *Framework* is not just a cosmetic improvement; *Framework II* adds significant value to the revolutionary original product.

The initial version of *Framework* introduced the concept of frames, which allows you to break information into small chunks that can be linked together logically. Once data is constructed in frames, it can be moved in any desired order.

Framework offered a complete set of integrated software tools: word processing, a spreadsheet, a database, graphics, telecommunications, and an outlining module. Rather than add modules, *Framework II* makes significant improvements in the modules that already exist—all within the structure of the original *Framework* and compatible with it.

Increased Capacity

One of the major features of *Framework II* is its ability to use virtual memory; the original was limited to available RAM. *Framework II* (\$695; \$140 to upgrade) takes advantage of hard disk space as well as enhanced memory cards such as Intel Corp.'s Above Board or AST Research Inc.'s RAM-page. This feature has particular significance for the spreadsheet and database modules. The spreadsheet capacity has been increased to 32,000 rows by 32,000 columns, and the database can handle many more files than it could previously.

Changes are evident upon booting. The desktop, for instance, has a new menu choice, "apps" (applications), on the menu bar, and a library option

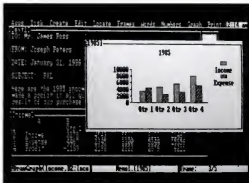
lies just above the disk indicators at the right-hand side of the *Framework II* screen. The apps menu includes telecommunications, a spelling checker, mail-merge, and label-printing options.

Unlike the original, which used the MITE program, telecommunications is now an integral part of *Framework II*. If you select telecommunications from the apps menu, a new menu appears with more communications choices. One is

menu let you run applications such as *dBASE III* from *Framework II* or programs written in FRED, *Framework II*'s built-in language.

Complete Control

Enhancements to the word processor module let you copy spreadsheet and database information into text documents. You have complete control over the printed page. You can control headers, footers, line spacing, condensed print, letter-



Ashton-Tate's *Framework II* (\$695 plus \$140 for an upgrade) offers significant improvements in every module of an already outstanding integrated program.

"Point & Dial Voice Call": Point to a phone number in any frame and have the PC automatically dial the number.

Other features of the telecommunications menu allow for text transfer, file transfer, and setup of communications parameters. Macros are available, too, for automating calls to on-line services. Telecommunications will work in the background, if desired, allowing you to capture a file over the phone while working in some other area of *Framework II*.

If you want to check the spelling in a document you've created, you just choose the option from the apps menu. The 80,000-word spelling checker works with both the word processor and spreadsheet.

Other options on the apps

quality print, and page breaks by selecting the features from a menu. Other features include soft hyphens, word count, a personal dictionary to add words to the spelling checker, and mail-merge. The search-and-replace function can use capitalization.

Mail-merge works with the *Framework II* database and also directly from file output from *dBASE* programs by including database field references in a word processing document. Once the desired database is moved to the desktop, you select mail-merge from the apps menu.

Other enhancements to the spreadsheet module, besides larger capacity, include faster performance, a new GOTO command, sort, and search and replace.

More Graphing Functions

The graphics module of *Framework II* now includes a high-low close graph. This feature adds to the normal graphing functions that existed in the original *Framework*: x-y, scatter, stacked, bar, and pie charts. Graphs can be printed or plotted in multiple colors.

The outlining module is similar to the original, with one exception—now you can outline using Roman numerals as well as standard Arabic numbering.

You can easily create keyboard macros with *Framework II*. The feature is available under the "create" menu. Once a macro is created, it is placed in the "library" on the desktop.

Foreign Trade

Framework II can import and export files to most popular programs including 1-2-3, WordStar, and *dBASE II* and *III*. This feature is found under the disk menu.

The FRED programming language remains a staple of *Framework II*. Now, however, programs can be accessed easily from the apps menu. Complete applications, which take advantage of the *Framework II* user interface, can be created with FRED.

PC Magazine's copy of *Framework II* installed properly on an IBM PC-XT, but not on an ITT Xtra XP. This is probably due to its new copy-protection scheme and is likely to be corrected because *Framework II* supports the machine. The copy protection allows you to boot from the hard disk without using a key disk but allows only one installation each for the system and system backup disks. It can be uninstalled, too. ■

Framework II

Ashton-Tate
20101 Hamilton Ave.
Torrance, CA 90502-1319
(213) 329-8000
List Price: \$695; upgrade,
\$140.

Requires: 384K RAM,
two floppy drives or one
floppy drive and a hard
disk, DOS 2.0 or later.

TASTM

the "Hard-nosed" Relational Database

\$129.

the Database + Integrated Accounting

\$349.

If You Liked DBase III, You'll Flip Over TASTM

Hard-nosed business owners have been asking for the power of DBase IIITM and RBase 5000TM but without the high price. That's why Business Tools, Inc. created TASTM.

Compare TAS with DBase III and RBase 5000. You'll see why we think TAS is the best "Hard-nosed" value around. TAS includes a data dictionary. TAS includes a true procedural language. TAS includes a run-time compiler. Plus TAS can be upgraded to multi-user for \$100.

TAS lets you develop your own professional menu-driven business applications. And not just simple ones either. TAS applications can hold up to 17 million records. And because TAS compiles them, they run fast.

Get TAS Accounting Software for \$349

But why stop with just a database? For just \$349, you get TAS Relational Database/Language plus General Ledger, Accounts Receivable and Accounts Payable. And for \$499 you get all the above plus Inventory, Sales Order Entry, Purchase Order Entry, and Payroll.

Source code is included FREE! So you can even modify the accounting to fit your business.

	TAS TM	DBase III	RBase 5000
Multi-User	\$100	No	\$1400
Data Dictionary	Yes	No	Yes
Procedural Language	Yes	No	Yes
Compiler	Yes	Yes	Yes
Records Per File	Unlimited	Unlimited	Unlimited
Files Open	16	10	40
Fields Per File	Unlimited	128	400
File Size	Unlimited	Unlimited	Unlimited
Record Size	10,254	4,000	1,530
Field Size	254	254	1,530
Prices	\$199	\$696	\$700

And TAS is no new comer. TAS was written by Phil Mickelson, the same "Hard-nosed" business person who created The Sensible SolutionTM (relational database) in 1982.

TAS comes with a 30 day money back guarantee (less handling fee of \$15 Level 1, \$30 Level 2, \$45 Level 3 and \$10 Multi-User). TAS is available for the IBM PC/XT/ATTM, CompaqTM, AT&T 6300TM, Tandy 1000, 1200, 2000TM and most MS-DOSTM CP/MTM and MP/MTM systems. Multi-user and LAN versions also available.

Call Today 1-800-648-6258
Ask for operator 22

Call our Toll-Free Hotline. Use your VISA or MasterCard to order today. Outside Washington call 1-800-648-6258. Washington residents call 1-206-644-2015.

Dealer Inquiries Welcome.

CIRCLE 472 ON READER SERVICE CARD

**BUSINESS
TOOLS
INC.**



4038-B 128th Ave. SE
Suite 266
Bellevue, WA 98006

The following are registered trademarks of these companies: TAS: Accounting Solution, Business Tools Inc. RBase 5000: MicroMetric, DBase III: Ashton-Tate, CP/M and MP/M: Digital Research Inc. IBM PC/XT/AT: International Business Machines Corp. Compaq: Compaq Computer Corp. AT&T 6300: AT&T Information Systems Inc. Tandy 1000, 1200, 2000, Tandy Corp. MS-DOS: Microsoft Corp. The Sensible Solution trademark rights are claimed by © Hansen Computer Systems Inc.
© Copyright 1985 Business Tools Inc.

TASTM

"Affordable Software For Your Business Needs"

Describe your computer system:

☐ 8 bit ☐ 16 bit
CP/M, MP/M MS-DOS
TurboDOS PC-DOS

Disk size is:

☐ 5 1/4" ☐ 8"

Computer name/model is: _____

Name: _____

Street: _____

City: _____

State: _____ Zip: _____

Phone: _____

4038-B 128th Ave. SE
Suite 266
Bellevue, WA 98006

Quantity:

____ TAS Database/Language-\$199
____ Level 2 Accounting (TAS, GL, AR, AP)-\$349
____ Level 3 Accounting (Level 2, GL, PQ, INV, PWT)-\$499
____ Multi-user upgrade-\$100
Subtotal (WA add 7.9% tax)
Shipping (USA-\$50.00 ea.)
(Foreign-\$250.00 ea.)

Total Enclosed:

Payment: ☐ VISA ☐ MC ☐ Cashier's Check
(All amounts are payable in U.S. funds only)

Credit Card Expiration Date: _____

Card Number: _____

Name on card: _____

Signature: _____

Business Tools Inc.

VISA

NOT COPY-PROTECTED

PathMinder™

from WESTLAKE DATA

Gives you a DOS Shell and more . . .



Library Maintenance



File Security



Application Manager



On-Line Editor



Systems Log



File Protection

AND MORE . . .

- * Easy installation—not copy protected
- * Archive attribute for backed-up files
- * Fast—100% assembly language
- * Context sensitive help screens
- * Manipulate multiple files in multiple directories with a single key stroke
- * Novice and Expert mode
- * File Move, File Kill functions
- * Personalized color mode
- * Economical—uses only 8K
- * Reasonably Priced—Only \$99.00 Plus shipping costs of \$5.00

JIM SEYMOUR, PC WEEK—PathMinder is “. . . a power tool far better than anything like it on the market . . . (it) is so fast, convenient and useful that I use it constantly, and can no longer imagine trying to run a large-capacity hard disk without it.”

DAVID IRWIN, DATA BASED ADVISOR—PathMinder “is the ideal utility for library maintenance . . . the best shell program on the market today . . . a ‘must own’.”

GARY SKIBA, VP AMERICAN PROGRAMMERS GUILD—“It may be a ‘shell’, but it acts as though it IS the operating system.”

PathMinder operates with IBM PC, XT, AT, 3270 PC or any true compatible running MS-DOS or PC-DOS version 2.0 or higher.

WANT MORE? . . . Get PathMinder™

To order, call toll free (800) 628-2828 ext. 555 or contact:



WESTLAKE DATA CORPORATION



P.O. Box 1711

Austin, Texas 78767

(512) 474-4666

PC UPDATE by VIRGINIA DUDEK

NEW YORK - IBM recently announced software price increases averaging from 8 to 10 percent on DOS and 136 other software packages. Versions 2.1, 3.0, and 3.1 of DOS were raised from \$65 to \$85; the PC Network Program and DisplayWrite 2 are now \$95 and \$385, respectively. Top View is now \$159, PC/IX, a version of UNIX, went from \$900 to \$989, and a series of communications software also saw nominal price increases. Prices for the IBM language programs also rose: APL is \$99, BASIC 2.0 is \$539, COBOL is \$379, FORTRAN compiler is \$275, Pascal compiler, Version 2.0 is \$385, and Macro Assembler Version 2.0 is \$189. There were no price hikes for the IBM Personally Developed Software and most applications in the Personal Decision Series, the Business Management Series, and the Assistant Series.

APX of New York announced Version 2.2 of APX Core Executive, an integrated software package that can create a multitasking windowing environment under DOS. Version 2.2 is compatible with most programs designed to take advantage of IBM's Top View windowing environment, yet it does not require special windowing versions of those software packages. Compatible programs include recent versions of the PPS series from Software Publishing, IBM's Decision series, PC-Talk, PC-AT, Relay, PCnet, and newer versions of the Novel Network. Version 2.2 will support users who want to use two or more programs at one time that require the 8087 math coprocessor. Concurrent applications of IBM BASIC are also supported. Send \$25 for a new program disk and manual.

Western Union announced that InFact, an on-line service of more than 600 databases, is now available to EasyLink subscribers. Database categories include legal case files, stock information, medical research, and philosophy abstracts. On-line vendors include Dialog, NewsNet, Questel,

VU/TEXT, and Bibliographic Retrieval Service. EasyLink subscribers can access InFact as a menu option on EasyLink's instant mail service. Rates are 15 cents per minute, plus an \$8 per search fee if the search yields results.

Short takes: AST Research Inc. of Irvine, Calif., and Digital Research Inc. of Monterey, Calif., announced that DRI's Concurrent PC DOS will support AST's RAMPAGE! extended memory board ... Corona Data Systems of Thousand Oaks, Calif., is shipping Version 3.0 of its LP-300 Laser Printer software. Several easy-to-use commands have been added, plus 38 dynamically loaded fonts. The 16-font Version 3.0 disk and the 22-font supplementary disk are \$3,395 each ... STSC Inc. of Rockville, Md., has announced the APL*Plus Application Development System, Version 5.0. The language processor now includes a numeric spreadsheet-like editor, a full-screen management feature, and multi-windowing for faster full-screen forms input. Updates are \$125. A run-time system of Version 5.0 is also available ... From now until February 28, 1986, Multimate International of East Hartford, N.Y., is offering free software with its MultiMate Advantage Professional Word Processor. Each package will include MultiMate GraphLink and Graphics Integrator and MultiMate On-File Information Manager ... Scarborough Systems of Tarrytown, N.Y., has upgraded Your Personal Net Worth, a home financial management program. The copy protection has been removed, and Net Worth now runs on the IBM PC AT, the AT&T 6300, the COMPAQ, and the COMPAQ Deskpro. Version 1.1 also has a reformatted, simplified net worth report. Updates are \$10. Call Scarborough at (914) 332-4545.

PC Update reports on software and hardware enhancements. To contribute, write or call Virginia Dudek, PC Magazine One Park Avenue, New York, NY 10016 (212) 503-5265

Clarity Presents AI Database Search Tool

BY VIRGINIA DUDEK

Clarity Software Corp. has announced a data search-and-retrieval tool with new applications of artificial intelligence and natural-language processing that can "read" the meaning of information in a database.

Logic-Line 1's natural-language interface can access a resident or a downloaded database without manipulating text according to spellings or grammar schemes. An algorithm, developed by Clarity founders Mike and Kathy Pincus, enables the

program to quickly search large amounts of data.

For example, a file containing a chapter from Alvin Toffler's *The Third Wave* is asked: "What will the role of women be?" The answers don't all contain the word "women," and some list concepts that pertain to the future role of women.

To retrieve information, you specify a list of keywords and a list of data or document files to be searched. *Logic-Line 1* can locate frequent occurrences of sets of words, cross-search words and their meanings, pro-

cess concepts, and display several views of the data.

The software runs on the PC, PCjr, XT, IBM compatibles, and the NEC APC and APC III.

It requires 128K bytes of RAM and one floppy disk drive. *Logic-Line 1* sells for \$175. Contact Clarity Software in Chesterland, Ohio at (216) 729-1132. ■



At \$175, *Logic-Line 1's* menu displays one-letter commands. You choose the kind of search to be performed and which files you want searched.



Networking Raised to a Greater Power

Advanced Technology. With it, IBM tripled the speed of the PC and increased its memory capacity five-fold. Nowhere is this increase in computing power more important than in networking situations. If the AT's technological advances have prompted you to look into a multi-user network, you owe it to yourself to take a closer look at MultiLink Advanced™... a unique multi-tasking, multi-user networking system that runs programs under PC-DOS 3.0.

Eight Workstations for the Price of an AT. MultiLink Advanced™ represents the next generation in networking systems for IBM microcomputers. The system enables terminals, connected to a single AT, to emulate IBM PC's having up to 448K of RAM (The PC-Shadow™ terminal, shown above, even has a PC look-alike, as well as work-alike keyboard and display).

This means that instead of spending \$3,000 per workstation for a PC with a Kilobuck™ Network Interface Board,* you can use inexpensive terminals... eight of which cost less than an IBM AT. Even if you need only one workstation connected to your AT, you'll realize significant savings.

MultiLink Advanced™... Instant Access to All of Your Resources. Central to most multi-user situations is the need to coordinate a variety of printers. With what's been described by *PC-Tech Journal* as "... by far, the best print spooler for the IBM PC," MultiLink Advanced™ gives users the option to print either at their workstations, or at a central location. In addition, programs and files can be shared by multiple users locally or through use of a modem. Just think of it... having remote access to an AT with a lightweight terminal modem.

Although designed to take advantage of the AT, MultiLink Advanced™ runs on all versions of PC-DOS, except 1.0, and certain implementations of MS-DOS. A wide range of leading programs are supported which include WordStar, dBASE III, Multimate, and Lotus 1-2-3.

Get the Advanced Story Today. Call The Software Link Today for complete details and the dealer nearest you. MultiLink Advanced™ is immediately available at the suggested retail price of \$495 and comes with a money-back guarantee. VISA, MC, AMEX accepted.

MultiLink™ ADVANCED



THE SOFTWARE LINK, INC.

8601 Dunwoody Place, Suite 632, Atlanta, GA 30338 Telex 4996147 SWLINK

CALL: 404 998-0700

Dealer Inquiries Invited

CIRCLE 17 ON READER SERVICE CARD

IBM PC, AT, & PC-DOS are trademarks of IBM Corp. MS-DOS, WordStar, dBase III, Lotus 1-2-3, and Multimate are trademarks of Microsoft Corp. MicroPlus, Ashton Tute Lotus Development Corp., & Multimate International, respectively.

THE SOFTWARE LINK, INC./CANADA
4011 Eglar Park Drive, Suite 18
Toronto, Ontario, Ont. M3J 3K2
CA (416) 477-1480

MultiLink Advanced™ & PC-Shadow™ are trademarks of The Software Link, Inc.

COMPLETE SYSTEMS

(Optional local warranty service available in most major metro areas)

IBM PC BASE

SYSTEM

IBM PC w/256K

Floppy Drive Controller
2 Double Sided Double
Density Disk Drives
Mix and Match with
your Favorite Monitor
and Printer!



IBM PC

HARD DISK SYSTEM

IBM PC w/256K

Floppy Drive Controller
1 Double Sided Double
Density Disk Drive
Half Height 10MB
Disk Subsystem

\$1,425.00*

\$1,709.00*

CALL FOR
LATEST IBM
ANNOUNCEMENTS

CUSTOM
CONFIGURATIONS
WELCOME

COMPAQ™

PORTABLE HARD DISK SYSTEM

w/256K/1 Floppy/Hard Disk



\$2,235.00* w/10MB

\$2,369.00* w/20MB

DESKPRO SYSTEM WITH TAPE BACKUP

640K CPU/1 Floppy/Hard Disk
10MB Tape Drive/Monitor



\$2,951.94* w/10 MB

\$3,151.94* w/20MB

Wholesale Prices Change Rapidly...if you ever see a lower price advertised anywhere please call! You will find the Network's Price will always be the best!

64K IBM PC MEMORY EXPANSION KITS

Quantity Discounts Available.
Guaranteed for Life!



Quantity of 100 Sets **\$3.96*** per set
Set of 9 Chips **\$5.40***

DISKETTES

Guaranteed for Life!

Brand name diskettes available in
boxes of 10 or in bulk packs of 50

5% DS/DD	5% SS/DD
\$8.95* Bx 10	\$7.95* Bx 10
.59* ea.	.47* ea.

1/2 HEIGHT DS/DD DISK DRIVES

INTERNAL PC HARD DISK

Low Power/Automatic Boot. Works on standard PC's
and Compatibles. Includes drive/controller/cables/
mounting hardware and instructions.



\$59.00*



10MB **\$330.00***
20MB **\$420.00***

Quantity Discounts Available

Quantity Discounts Available

\$285.00*

Record Price Increase by Lotus

WordPerfect

\$190.00*

MultiMate™

*Members pay 8% above this wholesale price plus shipping.

CALL TOLL FREE 1-800-621-S-A-V-E (orders and memberships)

In Illinois call (312) 280-0002 Validation code: A108

TM—Registered trademark of IBM and COMPAQ

NETWORK

... WITH THESE 15 UNIQUE BENEFITS

1 COST + 8% PRICING—The NETWORK purchases millions of dollars in merchandise each month. You benefit in receiving the lowest price available and all at just 8% above published dealer wholesale price.

2 OUR 600 PAGE WHOLESALE CATALOG—Members receive our 600 page wholesale catalog containing over 30,000 hardware and software products for the IBM PC, APPLE and over 50 other popular computer systems. THE NETWORK'S CATALOG IS THE LARGEST SINGLE COMPILATION OF PERSONAL COMPUTER PRODUCTS AVAILABLE TODAY. NOW UPDATED QUARTERLY!

3 IN-STOCK INSURED FAST HOME DELIVERY—The NETWORK maintains a giant multi-million dollar inventory of most popular products, allowing us to ship many orders from stock. Non-stock items are typically shipped in local warehouses just days away from The NETWORK and YOU. We pay all insurance expenses on your shipment. EMERGENCY OVERNIGHT SERVICE IS AVAILABLE ON REQUEST.

4 10 DAY RETURN POLICY—If you are not satisfied, for any reason on any hardware component purchased from The NETWORK within 10 days of receipt, we will refund your entire purchase (less shipping) with no questions asked.

5 MEMBERSHIP SATISFACTION GUARANTEE—If for any reason you are not satisfied with your membership within 30 days, we will refund your dues IN FULL.

6 EXPERIENCED CONSULTANTS—The NETWORK hires consultants, not order takers, to aid you in product selection. Our consulting staff possesses in excess of 150 man years of personal computer product experience. We back our consultants with our money back guarantee: IF ANY PRODUCT RECOMMENDED BY OUR CONSULTING STAFF FAILS TO PERFORM AS PROMISED—WE WILL TAKE IT BACK AT OUR EXPENSE FOR A 100% REFUND.

7 FREE TECHNICAL SUPPORT—The NETWORK supports every product it sells. Our qualified TECH-SUPPORT staff will help you assemble your system, interpret vendor documentation and get your software and hardware to work. WE WILL HELP YOU ALL THE HELP YOU NEED, WHEN YOU NEED IT—FREE!

8 OPTIONAL BUSINESS RENTAL LIBRARY—All members can join our BUSINESS RENTAL LIBRARY featuring over 1000 available titles for just \$25 PER YEAR above the base membership fee. This entitles you to rent business software AT JUST 20% of the DISCOUNT PRICE FOR A 14 DAY PERIOD if you decide to keep the software, the entire rental fee is deducted from the purchase price. VIP MEMBERS GET A FULL 30 DAYS for just \$30 above the V.I.P. base fee. This also includes the game library privileges for a \$5 combination savings.

9 OPTIONAL GAME SOFTWARE RENTAL LIBRARY—The Game Rental Library is available to members for just \$10 PER YEAR and permits evaluation (or just enjoyment) of any game or educational software product as above.

10 SPECIAL SAVINGS BULLETINS—THE PRINTOUT—Issued Quarterly at no charge to Network members only! The Printout contains all the New Product listings and price changes you need to keep your Catalog up to date. Also, we buy excess dealer inventories, and store bankruptcy closeouts, which we turn around and make available to our members at fantastic savings via THE PRINTOUT.

11 DISCOUNT BOOK LIBRARY—Working with numerous publishers and distributors, The NETWORK has assembled a library of over 1000 computer related books and manuals at savings of up to 75% from the normal store price.

12 MEMBERSHIP REFERRAL BONUS—Our most valuable source of new members is you! To date almost 40% of our members have been referred by word of mouth from other satisfied members. For those of you who refer new members, The NETWORK will credit a cash bonus to your account applicable to any future purchase.

13 CORPORATE ACCOUNT PROGRAM—Almost 50% of The NETWORK's members are corporate buyers and users (see opposite page left). The NETWORK can establish open account status and assign designated account managers to expedite orders, and coordinate multiple location shipments.

14 QUANTITY DISCOUNTS—For large corporations, clubs, and repeat or quantity buyers The NETWORK can extend additional single order discounts, when available to us from our manufacturers and distributors.

15 PRICE PROTECTION—The PC Industry is crazy!! Prices change not yearly or monthly or even weekly but often day by day! These changes are sometimes up but are mostly down!! THE NETWORK GUARANTEES THAT IN THE EVENT OF A PRODUCT PRICE REDUCTION, BETWEEN THE TIME YOU PLACE YOUR ORDER AND THE TIME THE PRODUCT SHIPS YOU WILL ONLY PAY THE LOWER AMOUNT!!
CIRCLE 245 ON READER SERVICE CARD



We printed these typefaces "as-is" on an Epson MX 80.

See What You Can Do With

Presentations! Flyers! Signs! Overhead Folios! Invitations! Menus! Logos! Announcements! Banners! Layouts! When you need a good looking visual quickly you need FONTASY — superb typefaces and simple drawing in one easy-to-use package.

FONTASY gives you a "what-you-see-is-what-you-get" picture, as you type and draw on the graphics screen of your IBM-PC. You can create a page at a time, see a mini picture of that page, print it, and save it on disk. Page size is limited only by memory, not by screen size.

Features

Proportional space, justify, kern, bold face, re arrange, magnify, black, white reversal, rotate, mirror image, lines, rectangles, ovals, draw, fill in, undo (and an undo), on-line help, 200-page book, and easy control from keyboard or mouse. Corporate licenses available.

Fonts, fonts, and more fonts! We have over 275 typefaces in our growing library, and will be happy to send you free print samples on request.

When you deal directly with the manufacturer (that's us), you pay rock bottom distributor prices. If you order FONTASY now, we will give you all 28 fonts shown above (a \$50 value) at no extra charge. With so many features at such a low price, FONTASY belongs in your software library even if you already have a "font" program.

FONTASY™

\$49⁹⁵

Introductory Price

Equipment Needed

IBM-PC, XT/AT or true compatible (Compaq, etc.) with graphics adapter and graphics monitor. 256k memory needed for partial pages. 448-512k recommended for full pages. Dot-matrix printer. Mouse optional. MS-DOS 2.10 or above. We show our fonts full-size (not photo reduced) and unretouched. We printed them on an Epson MX-80, and their

sizes may vary on some other printers. FONTASY supports: IBM graphics printer, Proprietary, Epson FX, JX, LX, MX, RX, and LQ (500), C. Itoh #510, 1550, 1570, Prowriter Jr, HP LaserJet, Microline 84-2, 92, 94, Gemini 10X, 15X, Radio Shack DMP 105-430, 2100; Toshiba 551, 1540-1551; Star, and most Epson-compatibles.

Money-Back Guarantee

We are the real, original PROSOFT, the company that has been a leading supplier of TRS-80 word processing and font software since 1980.

Fontasy is not copy protected and has a 30-day money back guarantee. So, take advantage of our breakthrough price and order now! TOLL FREE.

CIRCLE 308 ON READER SERVICE CARD.

1-800-824-7888, operator 577

For further information and same day shipping, call: (818) 765-4444

PROSOFT®

7248 Bellaire Ave
Box 560
No. Hollywood, CA 91603-0560

FONTASY \$49.95
Other font disks (\$2.95/disk)

Tax _____
Shipping _____
Total _____

Name _____ Company _____
Address _____ Telephone _____
City, State, ZIP _____

Visa/MC _____ Exp. Date _____
Computer _____ Memory _____ Printer _____

Terms: M.C. Visa, checks. Please add \$4.00 shipping and handling in U.S. / Canada. \$20.00 overseas. \$2.00 for C.O.D. and sales tax in U.S. and

To Boldly Go Where No PC Has Gone Before

Star Trek is a habit that can be suppressed but not cured. Simon & Schuster Inc., Computer Software Division, intends to capitalize on latent *Star Trek* addicts with its new game, *The Kobayashi Alternative*.

Micromosaics Productions Inc., which produced the \$39.95 software, cleverly uses

All the old favorites are here: Chekhov navigates the U.S.S. *Enterprise*, Uhura opens hailing frequencies, Spock gives terse information, and you even get to "hear" Dr. McCoy gravely announce, "He's dead, Jim."

Back when computers filled rooms and the principal desktop aspect to computing was sorting a stack of punch cards, the only real game was a rudimentary *Star Trek* where the screen was a sea of asterisks with fuel consumption figures. Now, even with the advanced graphics capabilities of modern PCs, text is blocked out in boxed windows, and the fuel consumption figures are still there.

But the biggest difference is apparent all the way to the bank: less than a month after release, Simon & Schuster's *Star Trek* is among the top half-dozen best-selling game programs. (Simon & Schuster Inc., Computer Software Div., 1230 Avenue of the Americas, New York, NY 10020; (212) 245-6400.) ■

BOOT US
UP SCOTTY.



text windows that pop in and out of the screen like cartoon speech balloons. You type, "Spock, scan the planet's surface," and a window appears, "Spock: Scanning, Captain."

Amazing Stories: Comedy by Wire

From the company that gave the world 1-2-3, *Symphony*, and *Jazz*, look for an integrated package called *PunkRock*, says a new industry newsletter. The program will "blatantly ignore commands and will occasionally destroy files by performing a feature called 'slam-crashing.'"

PunkRock reportedly will be packaged with a safety pin through the disk and a black leather manual illustrated with "photos of bludgeoned users working with software."

PunkRock is the mythical creation of New York stand-up comic Billiam Coronel (his real name, he says), who reports on the industry with tongue firmly in cheek in a four-page monthly computer-humor newsletter, *Comedy by Wire* (\$9 a year, 431 W. 45th St., New York, NY 10036).

Coronel realized "most people in a nightclub audience don't understand computer hu-

mor," so he cast about for a different vehicle than live stand-up engagements. He's on *The Source* and *Delphi* and recently started the newsletter. *Comedy by Wire* humor is uneven at times, but some bits are equal parts humor, truth, and irony.

It reports, for example, that a "showdown" between *Jazz* and *MacPaint* to discover which is the best Macintosh business tool found *Jazz* integrates five applications with a feature, called Hotview, that "allows an uncaught mistake in a spreadsheet to show up in dozens of connected graphs and letters." While *MacPaint* doesn't support decimal tabs or even simple formulas, results figured by calculator can be entered by hand and surrounded "with cute, dancing musical notes or laughing puppy dogs."

A *Comedy by Wire* interview with Lester Think, IBM's Vice President for No Comment, shed light on rumors about the PC II: "Someone overheard me say, 'In my office, I have a PC, too.' " ■

Let's Slip Granny a Program Disk and Turn Her in for Cash

Would a \$2,500 bounty lure you into turning in a friend for software piracy? How about the boss you never liked? And would you be willing to hand out unauthorized copies of software if you knew there was a \$2,500 bounty on your head? Meridian Technology Corp. is betting most users' answers will be yes, yes, and no.

Meridian sells *Carbon Copy*, a communications program that lets users control PCs from remote computers. The opening screen reads, "\$2,500 reward for information leading to the arrest and conviction of anyone using or selling an illegal duplicate of *Carbon Copy*."

According to Charles Jones of Meridian Technology, "We are really going as far as we can to support the product, and all we're asking in return is that people play fair with us. Unfortunately, the world being what it

is, I fully expect that we will be paying several people \$2,500."

Meanwhile, a different tack on copy protection is being taken with *Kwik Find*, a new retrieval utility by SOFTransit of Sausalito, Calif. After allowing you to make one backup copy, the program appears to allow unlimited duplication. However, any second copy is pro-

REWARD
\$2,500.00

Now is the time for all good men to come to the aid of their country. Do now to come to the aid of your country. Now is the time for all good men to come to the aid of their country. Now is the time for all good men to come to the aid of their country.

grammed to "freeze" during use and then pop up SOFTransit's phone number. The user can call the manufacturer, who explains how to unfreeze the program—once the check is in the mail. ■

Dear Santa Claus, If It's Not Too Late...

Fixing or upgrading your PC just got a lot easier with these 11 tools. If your interests are more modest, however, say, tightening the screws on a loose modem cable or opening the back of a PC to install an extra RAM board, the \$29.95 PC Tool Kit from MicroComputer



Accessories Inc. is just the thing.

The tool kit is designed to cope with the typical adjustments or repair problems confronting a PC user. The PC Tool Kit includes $\frac{1}{8}$ - and $\frac{3}{16}$ -inch nut drivers needed to open the case and remove circuit boards, a chip puller/insertor, long twee-

zers, a part extractor (handy for screws that fall into a crevice smaller than your fingers), a hard-to-find Torx-screwdriver (to deal with COMPAQ's fasteners), a tube for parts, and screwdrivers. The only commonly used tool not included: a pin inserter/extractor for cables.

If only software were this easy to fix. (MicroComputer Accessories Inc., 5271 Buckingham Pkwy., Culver City, CA 90231; (213) 641-1800.) ■

Communiqué With Us

Heard anything unique or off-beat about the computer world? We pay \$50 for every item published. Send your submissions to Communiqués, PC Magazine, One Park Avenue, New York, NY 10016; (212) 503-5293; MCI Mail 157-9301. Contributors to this page included Barbara Krasnoff, M. David Stone, and Charles Berman. ■

DATA SOURCES

FOR DP PROFESSIONALS AND COMPUTER SPECIALISTS WHO PLAY IT SMART.

In the complex and ever-changing computer field, smart means knowing how to make the right product choices. Without wasting time and money.

Which means DATA SOURCES.

DATA SOURCES is a complete reference "factbook" of virtually every computer system and software package on the market. With product comparison charts that let you compare specifications and prices at a glance.

It's the only resource of its kind.

With DATA SOURCES you can make better, more intelligent comparisons—from the broadest range of possibilities—in minutes.

Product Comparison Charts make it easy for you to quickly compare an entire group of products of a similar nature. Each entry includes a page reference directing you to more comprehensive information.

Hardware including terminals, printers, computers, memory devices and more.

Data Communications Included in the Hardware volume, covering the full range of data comm products—comm processors, local area networks, virtually anything you require.

DATA SOURCES is published four times a year, so your information is always up-to-date. And it comes in two handy volumes—hardware and software. Tightly formatted and superbly organized, DATA SOURCES will give you a complete overview of more than 25,000 software packages, 18,000 hardware and data communications products, and profiles of more than 10,000 manufacturing companies.

To subscribe, call toll-free 1-800-443-0100, ext. 251.

We'll send your first two-volume edition on a 30-day approval basis and enter your one year (four editions) subscription for just \$230—more than 24% off the regular price.

DATA SOURCES

P.O. Box 5845,
Cherry Hill, N.J. 08034

Company Profiles provide quick access to 10,000 hardware, software and data comm vendors.

HIGH-END MANUFACTURERS AND MODELS

MANUFACTURERS AND MODELS

HIGH-END MICROCOMPUTER (32-bit)

ALCYON

APS Integrated Data Workstation

APS R4S Rackmount

APX Extended Product

ALPHA MICRO SYSTEMS

AM-1000

AM-1000C

AM-1000X

AM-1042C

AM-1072

AM-1082

AM-1100

AM-1150

AM-1180

MULTIPLEXORS/CONCENTRATORS

DATACOMM MANAGEMENT SCIENCES (Continued)

Link loopback, indicators
Rackmount □ 17,000 channels
□ 1971

GENERAL DATACOMM INDUSTRIES, INC.

Company Profile located on page 100

MUX/VERTER

Point-to-point, Multipoint □ 10 to 50,000 bps async input □ Transceiver □ Composite units □ 1,800 bps rate □ General (common) and composite link loopback, local loopback, Remote channel indicators □ Up to 16 VF routes □ 300 bps modems □ Rackmount channel ends installed □ 1971 □ — \$4,000 (16 ch.)

1180 Series

Point-to-point, Multipoint □ 24 ch □ 26 async □ Up to 600 bps async □ RS-232C, 20,000 mV current loop input (see factbook) □ Transparent input □ 32 DP control □ 1 composite input □ 120 bps composite rate □ General (common) and local channel loopback, Remote channel loopback, Local composite link loopback, Indicators □ Standalone Rackmount □ 25,000 channels ends installed □ 1971 □ Purchase — \$575 (per ch.)

QTE NETWORK SYSTEMS

Member of QTE Corp.

PACKAGED NAME

SOFTWARE PACKAGE INDEX

WORD PROCESSING, On-Line Software International pg. N-1051

WORD PROCESSING, Project Information Systems pg. N-1050

WORD PROCESSING, Professional Business Computer Systems pg. N-1050

WORD PROCESSING, RCA Service Data Services Division pg. N-1054

WORD PROCESSING, S&S Computers pg. N-1034

WORD PROCESSING, Solution pg. N-698

WORD PROCESSING, State of the Art pg. N-1029

WORD PROCESSING, Stratus Computer pg. N-1050

WORD PROCESSING, Sydney Development pg. N-1051

WORD PROCESSING, US Plus pg. N-1034

WORD PROCESSING, Westland Business Systems pg. N-708

WORD PROCESSING, Word Processing Dictionary, Stratus Computer pg. N-1050

WORD PROCESSING ENHANCEMENT, Informatica General pg. N-1053

WORD PROCESSING IN SPANISH, Phidra Group pg. N-1034

WORD PROCESSING SYSTEM, Clonemex pg. N-1036

WORD PROCESSING SYSTEM, Madras pg. N-1055

WORD PROCESSING-SYS, IBM pg. N-1045

WORD PROCESSING/DATA CONFERENCE, Multi-Muglo pg. N-1043

WORD PROCESSING/ELECTRONIC TYPEWRITER, Surica Computer pg. N-1060

WORD PROCESSOR, Converter 12-bit serial reports, Trans-

WORMS, Rackmount □ 1,800 bps □ 1971 □ 1982 □ Purchase \$2,240 (24 ch.)

BLACK BOX DATA

See advertisement on 113, 141, 147, 148, 149

Company Profile loc. 1

CONC-CP

2, 4, 8 channels □

See async input: 1,800

WORDMAC, MM International pg. N-1051

WORDMAC, Pulsar 3-

SOFTWARE COMPANY PROFILES

MICRO LAB

2699 Steele Valley Rd

Highland Park, IL 60035

312-433-7550

President: Stan Goldberg, VP Marketing:

Susan Goldberg, VP Sales: Evelyn Burg:

VP Research/Dev: Mike Haskin

Sales \$5,000,000; Emp: 85; Est. 1980

Business Areas—Software

MICRO MANUFACTURING SYSTEMS

2630 Corporate Exchange Dr

Columbus, OH 43229

614-890-0738

President: Larry J. Fox, VP Marketing:

Gregory A. Miller

Sales \$1,200,000; Emp: 12; Est. 1979

Business Areas—Software, Turnkey

MICRO MATES

P.O. Box 2695

Reading,

PA 19601

215-871-7171

Owner: Bill

Sales \$17

Business

training

MICRO

3109 West

Fairfield,

CA 94534

President:

Emp: 14;

Business

Programs

Distributors

Sys. analy

MCA

312

312

MICRO PERIPHERALS, INC. (MPI)

9754 Dearing Ave

Channahon, IL 61311

312-739-4252; Tlx. 919-434-12

CEO: Ralph Gates; President:

Campeau, VP Marketing/Sales

Tronic

Sales \$60,000; Emp: 15C

1977

Manufactures—Disk equip

Other Business Areas—GSP

MICRO SOFTWARE,

5275 Edna Industrial Biv

Minneapolis, MN 55425

612-631-0079

President: Robert Hilar

Paul Clifford, VP Sales

Secretary/Treas: Tim

Sales \$1,500,000; E

Business Areas—S

Manufacturing



AN INFORMATION PRODUCT OF

ZENITH PUBLISHING COMPANY

Four Genicom Printers: New Kids on the Block

BY PHIL WISWELL

Genicom Corp., in a display of Yankee ingenuity, has introduced some solid data processing printers. One of a handful of American companies competing against Japan in the printer arena, Genicom recently released four new versions of dot matrix printers that were originally tested in *PC Magazine* last year ("Printers," Volume 4 Number 19).

Among the numerous improvements in the current versions of Genicom's printers are fast throughput, clean and appealing character fonts, and compatibility with the full IBM character set in addition to IBM and Diablo 630 protocols—overall an impressive performance.

Examination of the printers has proved that using the various fonts is no longer any trouble and the near-letter-quality mode is highly acceptable.

The Genicom Lineup

The \$1,995 Genicom 3310 is rated at 70 characters per second in near-letter-quality mode by PC Magazine Labs. Like the other three Genicom models, it has front-panel membrane buttons that allow you to program the printer. Whether issuing line/form feeds or programming the printer's configuration, the front panel is a very handy feature. The documentation offers a thorough explanation of the fonts and escape protocols.

Genicom's \$2,450 3310 Color printer boasts a high-density letter-quality font of 288 dots per inch; up from 144 dpi. But there's more: The 3310 Color has IBM graphics compatibility, a special ribbon used to mix colors, and well-documented escape codes for IBM, Diablo 630, and ANSI protocols. This is a fine color printer with a good near-letter-quality font, though it's worth considering whether you want to sacrifice

speed for the 3310 Color's color performance.

At \$2,395, the Genicom 3320 Quiet printer now has full IBM and Diablo graphics compatibility plus improved fonts. The near-letter-quality runs at a speed of 120 cps, and when Genicom called the 3320 a Quiet printer, it knew what it was doing.

The Genicom 3410, priced at \$2,450, also sports additional frills. It can put out draft print at a true 230 cps and a nice near-letter-quality print at 87 cps.

Ready for the Competition

Genicom has taken a big step up in the printer market. Much attention has been given to details such as the inclusion of three built-in escape code sequences, DOS graphics compatibility, and greatly improved throughput and font quality.

All four printers have solid, all-steel, American-built construction and are meant to handle an entire day of continuous use. They compare favorably to Okidata printers in performance, and Genicom offers more competitive prices. ■

Genicom 3310 Genicom 3310 Color Genicom 3320 Quiet Genicom 3410

Genicom Corp.
One General Electric Dr.
Waynesboro, VA 22980
(703) 949-1000

List Price: 3310, \$1,995; 3310 Color, \$2,450; 3320 Quiet, \$2,395; 3410, \$2,450.
Claimed Draft CPS: 3310, 3310 Color, and 3320 Quiet, 300; 3410, 400.
Actual Draft CPS: 3310, 3310 Color, and 3320 Quiet, 157; 3410, 230.

Note: All four Genicom printers have 15 1/2-inch carriage widths and near-letter-quality fonts. The standard printer features include type pitch settings continuous from 4.8 to 18 characters per inch, horizontal and vertical emphasis, correspondence quality, underline, sub- and superscript, high- and low-order characters, PC Graphics compatibility, and IBM Marix and Diablo 630 command sequence compatibility.

PC ADVISOR EDITED BY GUS VENDITTO

More Drives for Your Jr

I would like to know if there are any vendors who make and sell a hard disk or a second disk drive for the PCjr.

Linda Washington
Coral Springs, Florida

You've come to the right place for information. *Legacy Technologies* (Lincoln, NE 68504; (402) 466-8108) has a line of disk drives and expansion cards for the PCjr, but it has very limited distribution so you should order directly from them.

Their *Legacy* series includes: the *Legacy 1*, a floppy disk drive (\$495); the *Legacy 3*, a 10-megabyte hard disk (\$1,249); and the *Legacy 20*, a 20-megabyte hard disk (\$1,595). Each comes with a replacement for the PCjr's controller card, cabling, four extra expansion slots, and a separate power supply.

Typing in a New Style

I'm interested in a Dvorak-lay-

PC Advisor is a regular feature that helps readers choose the best hardware and software to improve their productivity.

out keyboard for a COMPAQ Portable. Does anyone make a keyboard that will work with a COMPAQ? What about a program to learn the Dvorak keyboard layout?

James Heinecke
Sheboygan, Wisconsin

Dvorak is actually an outgrowth of research by that Cheaper by the Dozen research team, Lillian and Frank Gilbreth, who filmed typists for their time and motion productivity studies. They showed that the so-called QWERTY layout requires clumsy motions to type the most common words and clusters the most common letters on the left side of the keyboard.

August Dvorak, of the Uni-

versity of Washington, designed and patented a new keyboard in 1932 that puts the most commonly used keys in the most comfortable positions and balances the work of the two hands by putting vowels on one side and consonants on the other.

There are two ways to adapt your COMPAQ Portable: use software that interprets the keys or buy a new keyboard.

SureStroke/Dvorak (Seasand Systems Inc., Chapel Hill, NC 27515; (919) 732-9391; \$95 plus \$4 shipping) comes with software that redefines the keys to the Dvorak layout, an instructional program, an audio cassette to help you learn, and stickers to paste on top of the keys. They'll also sell

you new keys for a COMPAQ Portable for \$35.

ProKey 4.0 (RaseSoft, (206) 524-2350; \$130), a keyboard macro utility; and XyWrite II, Plus (XyQuest; (617) 275-4439; \$295), a word processor, give you a Dvorak option, but you'll need new stickers for the same keys.

For a hardware fix, contact Key Tronic Corp. (Spokane, WA 99214; (800) 262-6006) and ask about model 5151D (\$255). You'll have to install a voltage adapter to provide the keyboard with 5 volts, instead of the 12 that come out of the machine's port. The RBH 851 (RBH Electronics, Spokane, WA 99214; (509) 922-0765; \$125) is an expansion card that performs this chore and provides a port for the keyboard.

Send letters to the PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016. ■

IF YOU THINK 60 MBYTE AUTOMATIC TAPE BACK-UP IS AN INCREDIBLE VALUE AT \$1395,

WAIT UNTIL SYSGEN SENDS YOU THE \$100 REBATE.

The Sysgen Smart Shopper Rebate
Sysgen Fulfillment Center
3606 W. Bayshore
Palo Alto, CA 94301

PAY TO THE
ORDER OF

**SMART SYSGEN
TAPE PURCHASER**

DATE Before 1/31/86

CHECK NUMBER
6805

THE AMOUNT OF

ONE HUNDRED DOLLARS

TOTAL AMOUNT
\$100.00

Sysgen

⑆605⑆ ⑆12⑆2⑆26520⑆ 064⑆0⑆2505⑆



Sysgen™ has made its already bestselling tape back-up for your PC, XT, AT,* or compatible an even smarter buy.

Automatic Back-up. Painless Data Protection.

Now you also get Sysgen's exclusive automatic tape back-up, as easy to program as a VCR! Set it once, and your Sysgen automatically backs-up your hard disk. No system demands less time or returns more consistent data security.

The new Smart QIC-File™ gives you the terrific Sysgen quality and technical support you expect. And Sysgen gives you the QIC-24 industry standard tape data format. A must. Plus automatic back-up. All this for an incredibly low price: \$1395—internal or \$1495—external.

*Program begins October 1, 1985 and concludes January 31, 1986. Sales receipts dated by Jan. 31 will be honored if postmarked no later than February 28, 1986. Mail to: SYSGEN-REBATE OFFER, Sysgen Fulfillment Center, 3606 W. Bayshore, Palo Alto, CA 94303. Certain restrictions apply.
Trademarks: Sysgen, QIC-File, Smart QIC-File, Sysgen, Inc., AT, International Business Machines Corporation. Registered Trademarks: IBM, PC-DOS—International Business Machines Corporation
47853 Warm Springs Blvd., Fremont, CA 94539
(415) 490-6770, Telex 49906843

Buy the Smart QIC-File before Jan. 31, 1986 and Sysgen will sweeten the deal with a \$100 rebate.

Simply return your completed warranty card with proof of purchase to the Sysgen Fulfillment Center at the address below, and we'll send you a check for \$100.*

The Sysgen Smart QIC-File is IBM® PC compatible—including all versions of PC DOS®. It copies disk data file-by-file in automatic mode and also includes an option for manual file-by-file and mirror image back-up.

Act before Jan. 31, 1986.

Don't miss out on the best deal in town for automatic tape back-up! For more information on Sysgen's superb line of hard disk and tape back-up products or the Sysgen dealer nearest you, call

1-800-821-2151.
Dept. 25



SYSGEN
INCORPORATED

THE PC'S LIMITED AT™ —\$1995. THE PC'S LIMITED TURBO PC™ —\$795.



At these prices, it's no wonder
we're burning up the marketplace.

Yes, you can believe it. Since we ran our first advertisement for the PC's Limited AT™ and Turbo PC™, the calls we've received mostly start with comments like "Is this for real?" And "How can that be?" But now that our machines are in the hands of influential buyers, the questions tend to concern quantity discounts for further purchases. (Which are available.) You see, the PC's Limited machines are assembled from components bought worldwide with our strong buying power. Then they are offered directly to you—with no middleman markups. So light a match to your old budgets. With the savings we're providing, you'll have money to burn.

PC'S LIMITED AT™

- 80286-based System Unit (runs at 6MHz, 8MHz optional)
- 1024K on Mother Board
- 1.2 Meg Floppy Drive
- Combined Floppy/Hard Disk Controller Card
- AT Keyboard
- 192W Power Supply
- 2 Serials and 1 Parallel Port
- Clock/Calendar with Battery Backup

Runs all Major Software written for the IBM PC™, PC XT™, and PC AT™. Unit has 8 Expansion Slots, with 7 available in above configuration. Same Bus Configuration as IBM PC AT™.

PC'S LIMITED TURBO PC™

- 16-bit 8088-2 System Unit (running at 4.77 or 6.66MHz)
- 640K on Mother Board
- 360K Floppy Drive
- Keyboard
- 135W Power Supply

Runs all Major Software written for the IBM PC™ and PC XT™, 40% faster, without modifications. Unit has 8 Expansion Slots, with 7 available in above configuration.

IBM® is a registered trademark of International Business Machines Corporation.
IBM PC, PC XT, and PC AT are trademarks of International Business Machines Corporation.



PC'S LIMITED™

SALES-RELATED CALLS OUTSIDE TEXAS, 1-800-426-5150

1611 Headway Circle, Building 3, Austin, Texas 78754

Sales Calls from anywhere in country, (512) 339-6962

Technical Support Calls, (512) 339-6963 Customer Service Calls, (512) 339-6964

Telex No. 9103808386 PC LTD

Ad number 2114

CIRCLE 179 ON READER SERVICE CARD

KNOWLEDGE man/2®



LETS YOU GET TODAY'S WORK DONE ... AND PLAN FOR TOMORROW



KnowledgeMan/2, the most advanced business software available, lets you be more

productive than ever before and in less time. These powerful business capabilities, tightly fused into a single program, work together for you:

- ☐ Relational data management
- ☐ Spur-of-the-moment inquiry
- ☐ Spreadsheets
- ☐ Statistical analysis
- ☐ Forms management
- ☐ Programming language
- ☐ Options for creating graphs, processing text, generating reports, painting forms, mouse processing and remote communications.

KnowledgeMan/2's four user interfaces make it easy for you... and all your business people... to work with KnowledgeMan/2:

- ☐ Menus, help screens and easy-to-use documentation guide your every step, if you're just beginning.
- ☐ Direct commands for the power user, with help available when you want it.
- ☐ K-Chat, the optional natural language interface, for asking for information in plain English.
- ☐ Procedural programming for the advanced user.

Get KnowledgeMan/2 working for you today. And start planning for tomorrow.

KnowledgeMan/2 is available for IBM PC, XT, AT and compatibles with PC DOS, 16-bit micros with MSDOS or CP/M-86. Special versions are available for UNIX multi-user operating systems and IBM, 3Com and Novell Local Area Networks (LANs).

For the name of the KnowledgeMan/2 dealer near you, call or write Micro Data Base Systems, Inc./Marketing & Sales, P.O. Box 248, Lafayette, IN 47902. 317/463-2581, Telex 209147 ISE UR.

KNOWLEDGE
man/2®
THE UNIVERSAL KNOWLEDGE MANAGEMENT SYSTEM

This Little Fella Means Business.

The Mouse by Maynard Electronics makes your favorite programs faster, easier, and smarter!



At last, an "intelligent" mouse! Now you can add command power to your programs, when you want, the way you want — instantly! The Mouse by Maynard Electronics comes with our CustomKey™ software which lets you assign and reassign commands while using your favorite programs — even those without mouse utilities. Fly through programs like Symphony*, Lotus 1-2-3*, Framework*, MultiMate*, and others with undreamed of speed! And of course, it's fully compatible with all programs written for a mouse, too.

*Symphony and Lotus 1-2-3 are trademarks of Lotus Development Corporation. Framework is a trademark of Ashton-Tate. MultiMate is a trademark of Softhome Systems Inc. Telepaint is a trademark of LCS/Telegraphics.



Teach The Mouse To Type.

A single Mouse click will instantly produce the character, sentence, paragraph, or anything else you've selected. **Click:** you call up the CustomKey menu. **Click:** your file is saved. **Click:** a commonly used paragraph appears in place. No other mouse gives you such power and versatility.

A Tale Of Three Mice . . .

Compare our Mouse with the others running around and you'll see, there's no comparison! Here are just a few features across the board:

FEATURES	Maynard Mouse	Micro-soft	Mouse Systems
# of Button Combinations	7	3	5
Button Auto Repeat	Yes	No	No
Diagnostics	Yes	No	Yes
Dynamic Scaling	Yes	No	No
Cursor Overshoot Control	Yes	No	No
Adjustable Cursor Speed/Up, Dn (while running application)	Yes	No	No
Adjustable Cursor Speed/Rt, Lft (while running application)	Yes	No	No
Buttons-Definable (while running application)	Yes	No	No
Macro-Definable (while running application)	Yes	No	No
User-Definable Alternate Cursor Movement	Yes	No	No

Free Drawing!

Purchase The Mouse now and receive the popular paint program Telepaint* at no additional cost — a \$149 value!



Maynard Electronics

Shaping tomorrow's technology.

460 E. Semoran, Casselberry, FL 32707 • 305/331-6402

Available at the finest computer stores. Contact your local dealer or write to us today for product information.

CIRCLE 478 ON READER SERVICE CARD

Epson 24-Pin Printers . . . Epson America Inc.'s new LQ-800 and LQ-1000 24-pin dot matrix printers, introduced in mid-November, fit between the FX-85/FX-185 and the LQ-1500 in price and performance, Epson says.

Epson claims the new models print 180 characters per second in



The Epson LQ-800 (\$799) and wide-carriage LQ-1000 (\$995) print at 180 cps in draft mode and 60 cps in near-letter-quality mode.

draft mode and 60 cps in near-letter-quality mode. The 24 pin wires are arranged in two vertical rows of 12, so letter-quality printing can be done in one pass of the printhead. The 80-column LQ-800 lists for \$799. The 132-column LQ-1000 is \$995. Both come with parallel and serial connections, a 7K-byte print buffer, and friction paper feed. Optional features are tractors, \$49.95 (LQ-800) and \$59.95 (LQ-1000), and single-bin cut-sheet feeders, \$129.95 and \$159.95, respectively.

In addition to draft, NLQ, and NLQ-proportional styles standard in the printers, drop-in font cartridges are available at \$49.95 each. Also available are "Personality Cartridges," \$79.95 options that make the printers think they're IBM Graphics or Diablo 630 printers. Without them, the LQ-800 and LQ-1000 print italic rather than graphics in the high-order character set.

The LQ-800 was shipped in November; the LQ-1000 was scheduled for a December delivery. Epson says the closest competitor is the Toshiba 1341 printer.

—Bill Howard

Optical Storage Joint Venture . . . Du Pont of Wilmington, Del., and N.V. Philips of the Netherlands have formed a joint venture to manufacture and supply optical storage media for the data, audio, and video industries. Starting with an initial \$150 million capitalization, the joint company projects 1990 sales of \$1 billion in a \$4 billion market.

All types of optical disks, from 4 1/4-inch audio compact disks to 14-inch, 4-gigabyte digital mainframe disks will be produced. Both spirally recorded CD ROMs and write-once CD PROMs and concentrically recorded optical disks in all commercial sizes will be supplied.

—Craig L. Stark

Targa Systems' Decision Images . . . Business presentation graphics are hitting prime time with the introduction of *Decision Images*, a series of products that combine television-quality images integrated with taped audio to produce persuasive presentations. The software, designed by Targa Systems Corp., offers graphics, video, a run-time module, image capture, freehand drawing, and audio integration. But the package owes its video quality to AT&T's Video Display Adapter with Digital Enhancement (VDA/D). This board essentially turns your standard 16-color IBM monitor into a 32,000-color television screen.

The VDA/D, designed by AT&T's Electronic Photography and Imaging Center in Indianapolis, works with digital and analog RGB monitors, composite color video monitors, and RF-modulated color television sets.

Targa Systems' *Decision Images* series consists of three workstation packages and an *Artistic Creation System*, all of which run on an IBM PC, XT, or AT with 512K bytes of RAM and DOS 2.0 or

later. *Artistic Creation System* can be used by an organization's art department to capture video and still images, design original graphics, manage libraries of images, and match the audio portion of the presentation to the on-screen display. It will sell for \$10,500.

The first package in the series is a tool set for creating charts and graphs and combining them with text; it will have a license fee of \$500 per package. The second product, which costs \$1,400 and includes the VDA/D, combines these functions with video capabilities. *Decision Images Presentation Plus*, the third in the series, is a run-time product that creates distribution disks of your presentations that will run under DOS without requiring the *Decision Images* software. It will have a licensing fee of \$350 per package.

For further information, contact Targa Systems at Cityplace, Hartford, CT 06103, (203) 275-6585.

—Stephanie Stallings

PCjr Sale-a-thon . . . IBM is pushing hard this holiday season to move the last of its PCjr computers out the door. Buyers may be able to find a PCjr with one disk drive and a color monitor for as little as \$650. IBM is running full-page ads in magazines and newspapers—"How to turn a little money into a lot of computer"—as well as radio ads. The PCjr, introduced November 1, 1983, never sold up to expectation, and IBM halted production in March 1985. IBM declines to say how many are left (industry analysts estimate 150,000 to 200,000) but does say sales are brisker in the fourth quarter than in the first part of 1985.

IBM Product Center list prices are \$725 for the one-drive unit and \$399 for the color monitor, or \$1,124 total. However, its dealers say they get a rebate of about \$175 per package, lowering their cost to about \$500 per package.

IBM isn't alone in discounting for the holidays. Tandy Corp. is offering a holiday package deal for its PC-compatible Tandy 1000 with a color monitor, 128K bytes of RAM, and a single floppy drive at \$999, rather than \$1,298.

Secret Agent PC . . . COMPAQ Computer Corp. of Houston, Tex., has introduced a version of the COMPAQ Portable 286 that meets the U.S. government TEMPEST data-security requirements. The Loral 3100T COMPAQ Portable 286, offered by COMPAQ in agreement with government electronics supplier Loral Electro-Optical Systems, incorporates a removable 20-megabyte fixed disk drive. This enables all stored data to be removed from the computer and kept in a physically secure location.

The 3100T also meets the government's TEMPEST requirements. TEMPEST stipulates that personal computers used for government and defense purposes must allow for the suppression of the electromagnetic radiation that PCs emit. It is this radiation that makes computerized data vulnerable, because it is open to being intercepted and read by outside agents.

A 3100T with one removable 20-megabyte fixed disk drive is \$11,999. Extra removable fixed drives are \$2,599. Shipments are scheduled to begin in January 1986.

—Virginia Dudek



The Loral 3100T COMPAQ Portable 286 has a 20-megabyte removable fixed disk drive.

Contact us for other low prices on hardware and software.
 Next Day Air Extra. Call for latest prices.

FREE SHIPPING

in the Continental United States

NO SURCHARGE FOR OR

20 MEG Hard Disk System for PC



Half Height

Internal \$469
External \$619

Includes Seagate Hard Disk, Western Digital Controller, Cables, Manual, Software, and Mounting Hardware.
 Boots From Hard Disk One Year Warranty

20 and 30 MEG High Speed 40 MS Hard Disks for AT



20 MEG \$579
30 MEG \$699

Includes Seagate Full Height Hard Disk, Cables, Manual, and Mounting Rails.
 Boots from Hard Disk. One Year Warranty.

Floppy Disk Drive



TEAC
 55-B, Half-Height, DS/DD

\$95

MITSUBISHI
 (Japan's Best)
 Half Height, DS/DD

SOLVE YOUR POWER PROBLEM. XT™ POWER 135W



\$89

25 or more \$75 each

Directly replaces power supply in PC.
 Fully XT™ compatible. One Year Warranty

Call us for competitive prices on larger quantities of RAM chips.

64K RAM

Set of 9 chips, 200 or 150 Nanoseconds

\$8

per set

256K RAM

Set of 9 chips

\$29

150 Nanoseconds

128K RAM for the AT™

Set **\$39**

300/1200 Baud Hayes Compatible Modem Fits in Short Slot



\$159

PC's LIMITED Six Function Card

- Upgradable to 384K
- Clock/Calendar
- Includes Software
- Parallel Port
- Serial Port
- Game Port



w/384K \$129

Two Year Warranty

PC's Limited AT Multifunction Card

- Expandable To 5 Meg (1.5 on Board/1.5 on Piggy Back Board)
- Supports 64 or 256K Rams
- Parallel Port
- Serial Port (2nd Serial Optional)



\$199

w/OK

Piggy Back Board \$59 w/OK

PC's Limited PC-576 RAM Board W/OK

- Expandable to 576K
- Supports 64K or 256K RAMs
- Fits in Short Slot



\$69

PC's Limited Floppy Controller Card



\$49

- Supports Up To Four Drives

once, read mostly) and CD (compact disk) drives.

Laser Buildup

A year ago, Hewlett-Packard and Apple were the big names in laser and related printing technology. Now the numbers reach well over a dozen. The trends: low-end prices edging toward \$2,000, rather than \$3,000; options other than the ubiquitous Canon print engine, including LED arrays and ion deposition technology; higher resolution; more speed; and some paper sizes bigger than 8½ by 11.

AT Compatibles

Epson America Inc., showed IBM PC AT-compatible computers. Epson's Equity I, II, and III line matches the PC, XT, and AT. Epson, banking on the name recognition of its printer line (13 new ones introduced in 1985), says it sold out of its first year's Equity line production.

MicroPro International Corp. of San Rafael, Calif., showed off *WordStar 2000*, Version 2.0, a major upgrade to the high-end word processor introduced a year before. The new package can directly import and manipulate 1-2-3 and *Symphony* files. MicroPro also took the opportunity to try to reposition the product. Says product manager Lewis Levin, "People saw *WordStar 2000* as an upgrade to *WordStar*, which wasn't true."

software. "That's fine if you're an idealist but not if you're going to play ball in the real world."

Core Concerns

Rubin doesn't think that IBM support was a major issue in Jobs' resignation. He adds that "Apple won't become any more compatible than it feels is necessary."

If Apple had any hope at all of moving into large companies, it had to become compatible with the token-ring network," says Rubin. "This won't cause a tremendous corporate rush to the Macintosh, but many companies prefer to use it, as it fits into their specific needs."

1-2-3's Match?

(continued from page 33)

TOTAL EXPENSES = SALARY + OVERHEAD

You might want another formula:

INCOME = TOTAL REVENUE - TOTAL EXPENSES

Instead of putting the formula B6-B18 into cell B24, you write the relationship in plain English. *Javelin* makes tables for these new variables, does the

view or split the screen and get two views. The most original is the diagram view, which shows how variables affect each other. The bottom part of the screen tells you that sales affect revenue, which affects income. You can move around the diagram and see how your model works, a convenience for anyone who ever got lost in a spreadsheet.

If you want a picture of your data, *Javelin* will throw up a quick bar or line chart. If you

record keystrokes or write code. You can tell at a glance how much memory you have left or if anything has changed after you have added a model.

In addition, *Javelin* has a nice choice of graphs: pie, bar, x-y scatter, line, and stacked bar. You can import ASCII or 1-2-3 files, and you can consolidate *Javelin* models.

Better than 1-2-3?

Will *Javelin* unseat the spreadsheets? I think not. Slick as it is, *Javelin* has real flaws. For one thing, all variables must be in a time series of weeks, quarters, days, and so forth. *Javelin* is really suited only for financial models that change over time.

Also, by giving up control over individual cells, *Javelin* gives up a lot. You've got to set up a formula that works for every occurrence of a variable. What if your sales-commission rate changed in 1984? Your formula has to be something nasty, like:

```
COMMISSIONS = RANGE (Jul 83, Sept 84, Sales * 0.05); RANGE (Oct 84, Dec 85, Sales * 0.07)
```

Another feature not found in *Javelin* is that it doesn't have database capabilities of its own. This is somewhat of a weakness, especially if *Javelin* is positioned to compete against a product like 1-2-3.

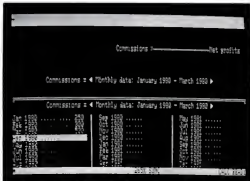
It's copy protected, too—not a good feature—although it can be booted from a hard disk.

Javelin is an ambitious program with fine features. It may be great for simple models, but its weaknesses could hold it back.

Watch for a full review of *Javelin* and other spreadsheet products in upcoming issues of *PC Magazine*, including Paperback Software's *VP Planner* and 1-2-3, Version 2.0. ■

Javelin

Javelin Software Corp.
One Kendall Sq., Bldg. 200
Cambridge, MA 02139
(617) 494-1400
List Price: \$695
Requires: 512K RAM,
DOS 2.0 or later.



Javelin has the facility to display data in different ways on a single or split screen. The diagram view feature shows how variables affect each other. *Javelin* also has chart, graph, table, and worksheet views.

arithmetic, and fills in the values. For complex operations, *Javelin* offers more than 70 1-2-3-like functions.

Javelin can show you different views of the same data. You can fill the screen with a single

want the monthly numbers for a variable, choose the table view. Ironically, the most useful view is the worksheet view, which lines up data in good old columns and rows.

Wherever possible, *Javelin* imitates 1-2-3. Spreadsheet users will feel right at home with the slash commands and menus. But *Javelin* does things the \$200-cheaper 1-2-3 never thought of.

It helps you spell. Variables are a lot easier to remember than spreadsheet cell addresses, but they're a pain to type. So, instead of repeatedly typing OVERHEAD, you can type the first two letters, OV, and hit the "spell" key. If only one variable starts with OV, *Javelin* types OVERHEAD for you. If there are more than one, a menu pops up and offers you a choice.

The program has a host of other great features. If you write a function, it will prompt you for the correct syntax and number of arguments. There is a macro language that lets you

"Apple recognizes that anyone who wants to exist in the computer market has to support IBM," says Bill Krause, president and CEO of 3Com Corp. in Mountain View, Calif. "I don't view Apple as compromising anything. It was a pragmatic decision. Users want to be able to share and exchange information. It doesn't matter anymore what kind of hardware they have."

"It's a great idea," says Marty Taucher, spokesperson for Microsoft Corp., which has a strong software line in both the IBM and Apple environments. "Any way it can tie both worlds together will allow us to leverage our development activities in both areas." ■

Fail COMDEX

(continued from preceding page)

uct. According to Ashton-Tate, the program boasts more speed, performance, and programming power, while using *Frame-work*-style pull-down menus. The price is \$695, the same as *dBASE III*. A \$995 LAN Pack, with automatic record locking and eight levels of password protection, can be added.

"We weren't too eager to make a major announcement at COMDEX," says an Ashton-Tate spokesman. "But the timing worked itself out. It turns out nobody is announcing anything significant this year. Strategically, we own the show."

Many other software houses were pushing to revise their programs for network operation.

Microsoft announced retail delivery of its *Windows* program and, to head off sniping about the 2-year delay, mailed out a calendar poking fun at itself and charting *Windows*'s delays since its November 10, 1983, announcement.

EGA and a Monitor to Go

COMDEX '85 was the year the PC world got serious about higher-resolution graphics. At least a half-dozen manufacturers announced boards that are compatible with IBM's Enhanced Graphics Adapter (\$545; \$982 with a 256K-byte memory), several boasting four emulations: the EGA, the original Color/Graphics Adapter (lower-resolution color), the Hercules, and the IBM monochrome.

By early 1986, feisty buyers should be able to land a board and matching monitor, such as a Princeton HX-12E, for a discounted price of \$1,000.

Video-7 Inc. and Quadram Corp. each say they were the first to ship a \$595, four-in-one, Video-7-designed 256K-byte enhanced graphics board. Called VEGA by Video-7 and QuadEGA+ by Quadram, the boards will be marketed differently by each company—Video-7 will sell primarily to PC makers and Quadram will sell to the public. Other companies with EGA boards at COMDEX were STB Systems



Approximately 80,000 attendees, paying \$25 a head, milled about the estimated 1.4 million square feet of exhibit space during the 5-day COMDEX extravaganza. The show attracted 1,250 exhibitors and introduced more than 65 new products.

Inc., AST Research Inc., Tecmar Inc., and Forte Technology Inc. Reportedly, one EGA board could approach the \$200 level, discounted.

Also look for at least one OEM to integrate a four-in-one video chip onto the motherboard of a PC in 1986.

Hercules, a COMDEX no-show, will be a holdout from the EGA bandwagon, choosing instead to develop its own higher-resolution color/graphics standard compatible with existing monitors. Hercules says IBM

EGA boards run too slowly.

Network News

IBM and a host of others displayed their local area network products. Most of the attention focused on IBM's new IEEE 802.5 token-passing-ring LAN, which was introduced in October, and compatible products from other vendors. Also in evidence were products that serve as a link to the new network.

The companies producing compatible token-ring LANs are Proteon Inc. of Natick,

Mass. (ProNET-4); Ungermann-Bass Inc. of Santa Clara, Calif. (Intro/Net); AST Research Inc. of Irvine, Calif. (AST Resource Sharing Network); Bridge Communications of Mountain View, Calif.; Nestar Systems of Palo Alto, Calif.; and 3Com Corp. of Mountain View, Calif.

Some of these companies are also producing gateways that link to the token-ring network. For example, Proteon's ProNET-Linkway will connect the token-ring LAN to faster ProNET LANs; Bridge Communications will link the token-ring to Ethernet LANs; and AST will link the token-ring to an IBM mainframe through the AST-SNA/BSC gateway.

Hard Disks Everywhere

Hard disks took three tactics: internal 10- or 20-megabyte "disk cards" that take one to two expansion slots; fast hard disks—many with cartridge backup; and 50-megabyte-plus hard disks meant to fuel the needs of networks and serious business databases.

Disk cards were shown by Mountain Computer Inc. (10-megabyte and 20-megabyte DriveCard), Plus Development (10-megabyte Hardcard), and HC Associates (20-megabyte HC 2045).

Several makers were also previewing just-over-the-horizon technology: WORM (write

Apple Will Link Mac To IBM Computer World

BY CHARLES BERMANT

CUPERTINO, Calif.—Saying that 1985 was "the year Apple grew up," Apple president and CEO John Sculley announced plans for a software link between Apple Computer Inc.'s Macintosh and IBM computers of all sizes.

While continuing a commitment to the Apple II line, the company will push the Macintosh as a workstation and, according to Sculley, "tie the Macintosh into the rest of the

computer world."

The link will allow a Macintosh access to data stored in an IBM mainframe, which can also be accessed by IBM PCs. Apple plans to use IBM's systems network architecture (SNA) and is now beta testing a program that allows *MacWrite* word processing files to be transferred to and revised by IBM word processors.

Standard-Bearers

Apple and IBM already have a lot in common. Each has set

standards for the personal computer industry. Neither comments on each other or about products under development. While information about the link is typically vague, it will take software form and hit the market in the next 3 to 18 months.

Former Apple chairman Steven Jobs, who resigned in September 1985, fervently believed the Mac was superior to the IBM PC and didn't want to go out of his way to support what he perceived to be an inferior technology.

"Jobs thought it would be stunning to support the PC," says Charles Rubin, who has written three books about Apple

PC News

NEWS IN BRIEF	38
COMMUNIQUÉS	46
PC UPDATE	53
DOWNTIME	58

Hardware Stars At Fall COMDEX

BY CHARLES BERMANT
AND BILL HOWARD

LAS VEGAS—COMDEX lasts only 5 days, but it yields nearly a year's worth of new products. Something shown here may have been introduced over the past summer or may not be available until next spring.

COMDEX '85 boasted a proliferation of 80286-based PCs, EGA-compatible graphics cards, local area networks, and lower-cost laser printers and mass storage devices. The result: a product-rich show with a

guardedly optimistic feel, despite a dearth of bombshell software announcements. The big software announcements—*Javelin* and *Paradox*—had been made earlier in the fall or, in the case of the finally delivered *Microsoft Windows*, 2 years earlier.

With an attendance of 80,000, the COMDEX population was larger than that of many American towns.

"Fall COMDEX is a permanent part of marketing in this industry," says Corvus Systems Inc. director of marketing Bill

Lanfri. "It is not a way to introduce products, but it is a good place to bring people together."

Doug Cooper, product manager of San Diego's Emerald Systems Corp. agrees. "It's good to meet people behind the technology and find there are actual names and faces behind the technology that people are promoting."

dBASE III on a Network

Ashton-Tate's *dBASE III PLUS* was the fall show's most significant new software product. (continued on next page)



Viva Las Vegas

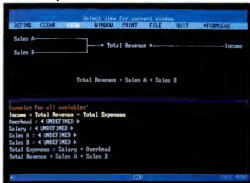
Has Lotus's 1-2-3 Met Its Match in the \$695 Javelin?

FIRST LOOK

BY JARED TAYLOR

Is there an alternative to the spreadsheet? Is the product that launched the micro revolution ready for retirement? So the makers of *Javelin* would have us believe. This new program is the first serious attempt to improve on the standard columns-and-rows spreadsheet. And it's taking a shot at the toughest competitor around: 1-2-3.

Javelin (\$695) has abandoned the classical approach to model building. Instead of putting formulas into cells or defining one cell in terms of an-



With *Javelin*, input variables are used to construct formulas. Once given the formulas, the program then assigns raw data to tables, makes calculations, and fills in the values.

other, *Javelin* lets you write formulas, enter data, and define relationships, while the cells take care of themselves.

Let's say your company has revenue from two products, A and B, and two kinds of expenses, salaries and overhead. These figures are what *Javelin* calls input variables; the numbers come from the real world. But instead of going into cells, as they would in a spreadsheet, they go into a table.

Plain-English Variables

Javelin takes the raw data you gave it as input variables and turns it into calculated variables. If you want total revenue and total expenses, you give *Javelin* two formulas that use input variables:

TOTAL REVENUE = SALES A + SALES B

(continued on page 35)

Two perfectly good reasons we should be happy.

Maximizer... And Maximizer AT...

Most companies would be satisfied with successful multifunction boards like these.

No one else's quality is so high. We perform exhaustive tests on everything, not just once but 3 times. We use multilayer construction for better noise immunity.

The only returns we've been getting are customers coming back for more.

And no one else offers so much for so little: **Maximizer** comes with 64K-512K RAM. **Maximizer-AT** comes with 128K to 4MB. Each comes with a printer spooler, and not just a parallel port, but a bidirectional I/O interface. We don't just give you one RS-232C serial port. You can add a second serial port and even a game control adapter. **Maximizer** features RAM disk software plus clock

and calendar, with battery backup. And both boards allow you to disable any unused function with a simple flick of a switch.

With all this, you'd think we'd be happy, but our engineers are still looking for ways to make it better.

For the dealer nearest you, call (408) 943-9490.

At Sigma Designs, we have a simple philosophy: It's our job to be dissatisfied. So you don't have to be.

Maximizer and Maximizer-AT are trademarks of Sigma Designs, Inc.



SIGMA DESIGNS, INC.
2023 O'Bole Avenue
San Jose, CA 95131
(408) 943-9480 Telex: 171240

Buy Mainstreet and Adept

ADEPT PC



\$749

ADEPT Personal Computer

- 640K RAM
- 360Kb Floppy
- "Touch Type" Keyboard
- 1 Year Warranty
- Runs IBM™ Software

30 Day Trial / 100% Credit Towards IBM PC

ADEPT SYSTEMS

ADEPT AT

\$1975

- 80286 Microprocessor
- 1 Megabyte Motherboard
- 1.2 MEG Floppy Drive
- Hard Disk Controller
- "Touch Type AT" Keyboard
- Runs IBM PC, XT, AT Software
- 8 Full-Size Expansion Slots
- 1 Year Warranty

Ask About Our 30 Day Trial Offer



Quick-Six Multifunction Board **\$139**

- Serial Port
- Parallel
- 384K RAM
- Clock/Calendar
- RAM Disk Software
- Print Spooler

For A Limited Time

Includes SIDEWICK!
\$54.95 Value Free



MONO/GRAPHICS BALANCE I **\$229**

- 720 x 348 Resolution
- Parallel
- Serial
- Runs 1-2-3

**Balance II
\$299**

Mono/Color Graphics

HIGH SPEED TAPE BACK-UP

\$739

20MB

Backs up 20 MB in
less than 10 minutes

60 MB

\$899

Similar to TECMAR
QIC-60

AT E•X•P BOARD

- 3MB RAM
- Serial Port
- Parallel Port
- For IBM or ADEPT AT

\$289

HARD DISKS by ADEPT

20MB

\$490

- Half Height
- Complete System
- Mounts Internally
- 1 Year Warranty

10 MB - \$390

32MB - \$695

For really FAST access, call our
hard drive specialist — 800-426-6246



CIRCLE 237 ON READER SERVICE CARD

24 Hour
Bulletin
Board
Service
UPLOAD
MAIL
DOWN/LOAD
ORDERING
512-321-3137
All New
Order Calls
512-321-4406

10, 20, 32 MB... From \$595
10 MB

Combination Systems

HARD DRIVE	TAPE	PRICE
10 MEG	10 MEG	\$1185
20 MEG	20 MEG	\$1190
20 MEG	60 MEG	\$1365
32 MEG	60 MEG	\$1870

**800 426-6246
ORDERS
512 321-4406**

Technical Assistance Mon-Fri 9 am-6 pm
Texas Residents, Inquiries Saturday 9 am-3 pm

Mainstreet Computer
1025 Main St.
Ruston, TX 76662

Hours:
Mon-Fri 9 am-6 pm
Saturday 9 am-3 pm

A perfect match! Colors and casing to conform with your IBM or ADEPT PC. In two convenient models to suit your space requirements. Add hard drives in 10, 20, 32 or 60 megabytes. Cartridge tape backup in 10, 20 or 60 megabytes. Combine hard drive and tape backup for complete storage solutions. All units come with power supply, cables, software and manual.



10, 20, 32 MB From \$635
10 MB

Combination Systems

HARD DRIVE	TAPE	PRICE
10 MEG	10 MEG	\$1225
20 MEG	20 MEG	\$1430
20 MEG	60 MEG	\$1705
32 MEG	60 MEG	\$1915

SOFTWARE—Many titles available 800 426-6246

Call for Latest Version and Price

Examples—Borland Superkey \$35 Copy II PC \$25
Multimate \$238 Norton Utilities \$49

IBM, XT and AT
are trademarks of
International
Business Machines
Corporation. All
other names are
trademarks of their
respective owners.
Prices are subject to
change without
notice.

Copyright 1988

How to Save Money...

IBM PC SYSTEMS



MAINSTREET ENHANCED

PC \$1965
with 10-MB Disk

Same System with
20 MB Hard Disk

\$2085

- 360kb Tandon Floppy
- 10 MEG ADEPT Hard Disk
- 256K RAM
- All Controllers, Cables, Manual
- 1 Year Warranty

Monitor Not Included Many Options Available

IBM PC/AT

AT PLUS \$3860

20MB System
Includes:

- 1.2 MB Floppy
- 360 KB Floppy
- 512K RAM
- 20 MB Hard Disk
- Serial/Clock
- All Cables, Controllers, Manual



Same System
with 32 mb

\$4071

Monitor Not Included

MORE IBM PC SYSTEMS FROM MAINSTREET

← SUPER PC

- 256K RAM
- 360K Floppy
- 10 MEG

- Tape Drive
- 130 Watt
- 640K RAM

← Slot Saver

- 2 360K Floppies

- 20 MB Hard Disk
- Permag Video Combo
- 3 Slots Available

← SUPER PC+

- 640K RAM
- 2 Floppy
- 20 MEG HARD
- Tape Backup

- AST 6 PAK
- 130 Watt
- Power

← PC 2/20

- 256K RAM
- 2 360K Floppies
- 20MB Hard Disk

CHIPS

64K - **\$8**
DRAMS

256K - **\$35**
DRAMS

8087-3-\$129
80287-\$250

Printers

EPSON FX-80	\$299
EPSON LQ-1500	\$929
EPSON FX-185	\$499
EPSON LX-80	\$569
TOSHIBA 1340	\$220
TOSHIBA 351	\$1099
TOSHIBA 1351	\$999
TOSHIBA 341	\$939
NEC E-L-F	\$649
CITIZEN M8P-10	\$239
OKIDATA 182	\$349
OKIDATA 192	\$349
OKIDATA 193	\$549
OKIDATA 84	\$759

BACK-UP POWER ADEPT

DataShield AT 800	\$649
Back up power 800 Watts	
DataShield XT 300	\$369
DataShield PC 200	\$285
DataShield AT 500	\$559

SURGE Protection

DataShield S 100	\$59
DataShield S 85	\$49
DataShield S 75	\$36
Kennington Masterpiece	\$95
Computer Accessories	



COMPAQ

20 MB
System
\$2999

- FAST 8086 Processor
- 640K RAM
- 20 MB Hard Disk
- 2 - 360kb Floppy
- High Resolution Monitor
- Basic
- 1 Year Warranty

Tape Back Up
10 MB \$590
20MB
\$739

TO PLACE YOUR ORDER CALL
1-800-426-MAIN



HOURS: 9am to 6pm CST M-F Sat 9-3

RODIME
10 MB
For
Compaq
\$475

COMPAQ Portable
\$2466

256K, 360KB Floppy, 10MB Hard Disk

ORDERING INFO: All Mail: 1025 Main St., Bostrop TX 78602.
We accept personal and corporate checks. No delay if driver's
license and expiration included. Shipping is free on prepaid orders
via UPS Ground. Air is extra. We accept VISA, MC. (Am. Exp.
and Diner's Club - 3% surcharge.) We double manufacturer's
warranty on all hardware. Software is not returnable. All goods are
new.

Meet The Princeton Graphic Systems Family.

The right monitor at the right price. Princeton Graphic Systems offers you a complete family of high performance personal computer monitors. Monitors that deliver the compatibility, resolution, and reliability you need for any application and any budget: from word processing to sophisticated business graphics.



HX-12. High resolution RGB monitor -640 x 200 lines noninterlaced - .31 mm dot pitch tube-Nonglare screen -\$695

HX-12E. High resolution RGB monitor 640x350 lines noninterlaced - .28 mm dot pitch -Compatible with IBM Enhanced Graphics Adapter -Nonglare screen -\$785



MAX-12. Amber monochrome -720 x 350 lines -Enhanced to interface with IBM color or monochrome adapter card -Nonglare screen -Can display 16 shades of amber -\$249



HX-9/9E. Nine inch, high resolution RGB monitor non-interlaced - .28mm dot pitch tube -9E compatible with IBM Enhanced Graphics Adapter -Nonglare screen -Green/amber switch -Apple/IBM colors - Etched dark glass screen -\$650/\$750 (9E)



SR-12P. PGS's top of the line RGB monitor 640x480 lines noninterlaced - .26 mm dot pitch - Analog input allows for the display of 4,096 possible colors -Compatible with IBM Professional Graphics Adapter -Nonglare screen -\$999



SR-12. Super-high resolution RGB monitor -640 x 400 lines noninterlaced - .31 mm dot pitch tube - Nonglare screen - Requires interface card -\$799



Princeton accessory product line. Undergraduate 801/swivel monitor base. Colorview card, Green/Amber switch, RGB-80 card and Scan Doubler card.

Princeton Graphic Systems. The only real choice.

For office or home use, Princeton Graphic Systems has a monitor that's right for you. Inquire at your local computer store about our complete line of high resolution color and monochrome monitors; monitors that live up to the Princeton Graphic Systems' tradition of quality, performance, and value. **Princeton Graphic Systems.** 601 Ewing Street, Bldg. A, Princeton, N.J. 08540. (609) 683-1660 Telex: 821402PGSPRIN (800) 221-1490. Ext. 302

PRINCETON

GRAPHIC SYSTEMS
AN INTELLIGENT SYSTEMS COMPANY

CIRCLE 224 ON READER SERVICE CARD

IBM IBM Enhanced Graphics Adapter and IBM Professional Graphics Adapter are trademarks of International Business Machines Corp. Colorview is a trademark of Control Data Systems, Inc. Apple is a trademark of Apple Computer Corp. PC Model is a trademark of CMI Communications Inc. SR-12 screen courtesy of Mousa Systems, Inc.

MICRO CAP and MICRO LOGIC put your engineers on line... not in line.



MY OWN WORKSTATION



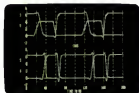
How many long unproductive hours have you spent "in line" for your simulation? Well, no more. MICROCAP and MICROLOGIC can put you on line by turning your PC into a productive and cost-effective engineering workstation.

Both of these sophisticated engineering tools provide you with quick and efficient solutions to your simulation problems. And here's how.

MICROCAP: Your Analog Solution

MICROCAP is an interactive analog circuit drawing and simulation system. It allows you to sketch a circuit diagram right on the CRT screen, then run an AC, DC, or Transient analysis. While providing you with libraries for defined models of bipolar and MOS devices, Opamps, transformers, diodes, and much more, MICROCAP also includes features not even found in SPICE.

MICROCAP II lets you be even more productive. As an advanced version, it employs sparse matrix techniques for faster simulation speed and larger net-

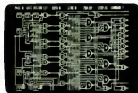


"Typical MICROCAP Transient Analysis"

works. In addition, you get even more advanced device models, worst case capabilities, temperature stepping, Fourier analysis, and macro capability.

MICROLOGIC: Your Digital Solution

MICROLOGIC provides you with a similar interactive drawing and analysis environment for digital work. Using standard PC hardware, you can create logic diagrams of up to 9 pages with each containing up to 200 gates. The system automatically creates the netlist required for a timing simulation and will handle networks of up to 1800 gates. It provides you with libraries for 36 user-defined basic gate types, 36 data channels of 256 bits each, 10 user-defined clock waveforms, and up to 50 macros in each network. MICROLOGIC produces high-resolution timing diagrams showing selected waveforms and associated delays, glitches, and spikes—just like the real thing.



"Typical MICROLOGIC Diagram"

Reviewers Love These Solutions

Regarding MICROCAP... "A highly recommended analog design program" (PC Tech Journal 3/84). "A valuable tool for circuit designers" (Personal Software Magazine 11/83).

Regarding MICROLOGIC... "An efficient design system that does what it is supposed to do at a reasonable price" (Byte 4/84).

MICROCAP and MICROLOGIC are available for the Apple II (64k), IBM PC (128k), and HP-150 computers and priced at \$475 and \$450 respectively. Demo versions are available for \$75.

MICROCAP II is available for the Macintosh, IBM PC (256k), and HP-150 systems and is priced at \$895. Demo versions are available for \$100.

Demo prices are credited to the purchase price of the actual system.

Now, to get on line, call or write today!

Spectrum Software

1021 S. Wolfe Road, Dept. F
Sunnyvale, CA 94087
(408) 738-4387

LEARN 'C' R WASTEFUL! (AT PRICES ANY BUDGET CAN AFFORD)

Learning C was once a rough go. First you spent a little money on a book. Then you spent a lot of money on a compiler. Then you spent a load of time figuring out what the two were talking about.

That changed when RUN/C debuted. It is an interpreter. It puts C at your fingertips, makes it interactive. It has a 304-page manual, every feature of C matches across the pages in an alphabetical procession of micro chapters. It gives you over 100 sample programs on disk to try out, all discussed in the text. And it sold for a great price.

RUNC INTERPRETER: Huge Manual and Sample Programs Make 'C' a Breeze to Learn.

RUN/C is better than ever. We have paired it with Mark Williams' CTM at a special price — ideal for learning the language on a shoestring. Or if you are already an expert, or will need advanced features, there's the new RUN/C Professional. Three giant products with genuine prices.

RUN/C makes C like IBM[®] BASIC, with familiar commands like LIST, MERGE, SAVE and FILES. It has a full-

screen editor with a WordStar[®] like feel which allows you to insert, edit, list or delete lines on the spot. At any time, just say RUN and your program executes instantly. If an error halts it, RUN/C explains why and where. Just say EDIT and RUN again.

What a difference! Because, time was, you wrote C programs with an editor. Editors are inert. They don't know how to run a program, so there's no way to

test little segments, get any feedback. And when finally ready to attempt a compile, only if your entire program gets 100 for grammar and semantics do you see any of it actually run. RUN/C puts an end to that guesswork, for badging code. It lets you test code rapidly, without fussy checking. No more making things extra dry for the compiler. Instead, try out things devoid of any care. Let RUN/C find your mispellings and malapropisms. It's nothing to change them and re-RUN.

HOW RUN/C DOES IT

Being an interpreter, RUN/C expects nothing but source code, but it is equipped with over 100 standard functions — a composite of the function libraries of major compilers — so that, should you someday compile your RUN/C program, function calls will already find counterparts in your compiler's library.

#includes can pull in "define" and other source code files — functions you have already written, for example, or functions from commercial libraries, which provide source code, like Greenleaf and BASIC[®] C.

NO END OF FEATURES

The more you look, the more powerful the product gets. TRON displays each line of source code as it executes, pinpointing where a program takes a wrong turn. TRACE shows the values of variables in a statement each time it is

encountered. PRON lists a program after a run showing the number of time each statement was executed, a vivid picture where to optimize for efficiency.

RUN/C has a SHELL command which will invoke any operating system command, with both RUN/C and your program in memory. No need to exit and reload everything.

And finally, the EDITOR command. Assuming enough memory, if you do not wish to part with your favorite editor, RUN/C can load it in parallel to let you switch back and forth.

NO BETTER WAY TO LEARN C

RUN/C makes a splendid teacher. Its manual not only explains RUN/C, but provides a thorough-going demonstration of the C language itself. Over 100 of its short chapters are devoted to RUN/C's built-in functions, each with a sample program demonstrating its use. These same programs are on the disk. So as you read them in the manual, you can run them on the screen, see what they do, discover why they do it, tamper with them to learn by experiment.

It's all here. A thoroughly satisfying integration of high quality documentation, source code examples, editor, interpreter and utilities which will add speed and pleasure to programming.

Product:	Last	PC Brand
S0910	\$120	\$109

RUNC's NEW PROFESSIONAL MODEL: The Interpreter That Links to Binary Libraries.

RUN/C Professional has every feature contained in RUN/C, but adds some major capabilities. The big difference — Loadable Libraries[™] which tackles the professional programmer's greatest obstacle to using an interpreter. If an interpreter expects nothing but source code, how does one integrate professional libraries which come only in binary? RUN/C Professional does just this. It dynamically loads (and even links) multiple object code library libraries while in the interpreter. Once set up, simply command:

loadlib c:food

and come and get it. The full page of C Food Storage[®] library's functions can be called from your program as if they were built right into RUN/C. Your program can now reach for Greenleaf Functions[™] the C Utility Library[™] — any of the professional libraries compiled using Lathe's large model. RUN/C's manual clearly documents how to construct, using Lathe, loadable programs like our "c:food" above, extracting any selection of functions you desire from these libraries.

How about your own function collection? No reason why not. Compile them up into a Lathe library-model library, and then turn up for RUN/C to interpret the same way.

WILL CHANGE HOW YOU WORK

RUN/C Professional will interpret your program, but the called library functions will be at compiled code speed. RUN/C Pro thus becomes a fast front end for projects of any size. Its new ability to accept object code means that, as you complete source code segments of a large

project, you can move them into fast-executing object libraries in a continuous stream until the entire job is completed.

BIGGER BUG KILLERS TOO!

RUN/C Professional adds a new level of built-in debugging aids to RUN/C's TRON and TRACE. They are ingeniously installed behind one of RUN/C Pro's built-in functions, so you can even call for debugging continuously.

Call the debug function with virtually any of RUN/C's own commands in a string argument (eg, "LIST 400-500"); it will execute your command and continue the program. Or call it anywhere in your program with the argument "break" and you'll have a menu of aids to choose from. Type interruptio C systems for immediate execution, or switch on single-step, tracing, or change variable values in the current function, or display even "auto-reload" variables from the full chain of functions leading to the current function. RUN/C is alert, ready to go, so much more immediate and responsive than the clunking editor/compiler treadmill. Superb for rapid, on-the-spot testing of what you are writing, RUN/C shows you results while the thoughts are still fresh, helps get code up and running much quicker.

Product:	Last	PC Brand
S0606	\$250	\$225

RUNC, RUN/C Professional and Loadable Libraries: TM, Age of Reason Co. C, LET's C, TM Mark Williams. IBM registered TM (Int'l Business Machines Corp.). Greenleaf! TM Greenleaf Software, Inc. (all rights reserved). TM and C Food Storage[®] TM of Lathe Inc. C Utility Library[™] TM Greenleaf Software, Inc. Wordstar registered TM Micropro/Unix TM Bell Laboratories

LET'S C COMPILER: The Famous, Full-Featured Mark Williams Is Now Sized for Any Budget.

If we told you that the top-rated \$498 Mark Williams compiler can now be had for \$75, you'd ask whose brother-in-law was the on site bright hanger, right?

Well, it's legitimate. The folks at Mark Williams want C usage to expand more rapidly. Make available a low-cost version of their great product, they reason, and in time people will trade up to Big Mark. So they created LET's C. First, the best one has built-in debugging. Then, in LET's C instead, this post-compile debugger can be had in a separate \$75 product. Second, LET's C supports the small memory model, not the large. And you are saying, they have hacked the poor devil to pieces. Not so! LET's C is the full Mark Williams compiler in every other respect. The same

fast, compact code and rapid compile times, with register variables and even the optimization features of its big brother. The same assembler, linker, archiver, and UNIX[®]-style utilities, such as extended grep, tail, wc, plus the macroMCS[®] screen editor with source.

In fact, we offer the full Mark Williams two pages forward. No post repeating ourselves further. The real point is that if you are learning C, you probably won't need the large memory model, so LET's C is an extraordinary value which will fit your agenda for some time to come.

Product:	Code	Price
LET's C	\$090	\$75
C Source Debugger	\$070	\$75

SPECIAL COMBINATION OFFER

Upgrade:
From Original RUN/C to new version: \$6
From RUN/C to RUN/C Professional: \$6

RUN/C & LET's C	\$200	\$175
RUN/C Pro & LET's C	\$325	\$275

SOME TECHNICAL NOTES

RUN/C occupies nearly 180k bytes, and requires 256k of RAM. Programs up to 10,000 lines can be interpreted, although 2,000 lines is a more realistic ceiling. Structures, unions, inlines and #defines with arguments are supported, as well as keyboard and screen redirection from and to files. No external definitions. RUN/C requires that all functions must be **ANALYZED**, **TYPEDEF**, **REGISTER** and function pointers are not supported as of this writing. RUN/C automatically senses and uses the 8087 and 80287 math chips.

RUN/C PROFESSIONAL requires a minimum of 320k of RAM with 512k recommended for management of multiple loaded libraries. The Lathe compiler is required to create a Loadable Library.

What're you waiting for?

800-C-BRAND

That's (800) 722-7263. In NY State call (212) 410-4001.
PC Brand, PO Box 474, New York, N.Y. 10028
Telex: 667962 (SOFT COMM NYK)

Our advertisement continues on the following pages

Actually, we give you two things free.
Our source code. And your freedom.

Just buy part or all of our excellent integrated business accounting system, the SBT Accounting Software Library.

We'll give you our source code absolutely free.

Which, in turn, gives you the freedom to customize our software to fit your business needs.

Say, for instance, you want to change the way a management report is formatted. Our free source code enables you to change it.

What's more, the change will be quick and simple because our software is written in easy-to-use dBASE.

In fact, the entire SBT Accounting Software Library runs with dBASE III or dBASE II* so you get the power and flexibility of those best-selling programs. Plus the freedom to use any computer that runs dBASE.

The SBT Accounting Software Library. Great software and freedom. All in the same box.



Free source code in every box.

Call today for our demo disk and brochure.
(415) 331-9900.

THE SBT ACCOUNTING SOFTWARE LIBRARY.

dProfessional	Time & Billing	\$395
dOrder	Sales Order Processing	\$195
dInvoice	Billing/Inventory Control	\$195
dStatement	Accounts Receivable	\$ 95
dPurchase	Purchase Order	\$195
dPayable	Accounts Payable	\$295
dPayroll	Payroll/Labor	\$395
dLedger	General Ledger/Finance	\$395
dAssets	Asset/Depreciation	\$195
dProject	Project/Job Accounting	\$395
dBackup	Menu/Backup	\$ 65



Three Harbor Drive
Sausalito, CA 94965
(415) 331-9900

Call today for the name of the SBT consultant
in your area.



*Compiled versions are also available. dBASE III and dBASE II are registered trademarks of Ashton-Tate, Inc. Copyright 1985, SBT Corporation.

CIRCLE 470 ON READER SERVICE CARD

NORTHE

(See Below)

WE WILL BEAT

1. Top our unmatched selection and inventory of software/hardware for the Apple, Mac (as well as the IBM PC, and Commodore Amiga).
2. School and corporate purchase orders are welcomed. CALL 1-800-874-1108.
3. Special/rush orders. If something you need is not listed, hard to find, or needed in a hurry. CALL 1-800-874-1108.
4. Order Status. CALL (203) 375-3860.
5. FREQUENT PURCHASER PROGRAM. Effective 10/14/85, any repeat customer who has placed an order after 9/4/85 will automatically receive \$1 off any order he or she places with us. Please mention to your operator that you are a repeat customer. We value your continuing business. Send in \$1,000 worth of invoices (representing previous purchases) and you will receive a coupon worth 1% off any future purchase. With \$5,000 worth of invoices, receive a coupon worth 5% off any future purchase.
6. SOFTWARE RENTAL LIBRARY. For 25% of our price, rent any program for two weeks. Apply your rental fee toward purchase if you choose.
7. No additional charges for credit card orders.
8. Convenience hours. 7 days/week:
9 AM-11 PM EST.
9. Technical experts on duty.
10. FREE AIR EXPRESS SHIPPING. Purchase \$150 or more of software and for no additional charge we will ship your products by air courier. Mention this to your operator as you place your order.
11. FURTHER DISCOUNTS BY MAIL. Circle the items in our ad you want, send the ad in with the coupon below and receive \$.50 off each item! Cut out a competitor's ad with a lower price and we will give you \$1 off his price (subject to the conditions below).

SPECIALS PARADISE SYSTEMS

See ASST PA 2044 A Subclass	247.00	SPH2 (w/BL)
Color 300***		Modeling Systems
Color 300**	257.00	MS-100
Color 300*	173.00	MS-100 Display Unit
Color 300		PERFECT DATA
Color 200***		PERFECT DATA
Color 200**		PERFECT DATA
Color 200*		PERFECT DATA
Color 200		PERFECT DATA
Color 100***		PERFECT DATA
Color 100**		PERFECT DATA
Color 100*		PERFECT DATA
Color 100		PERFECT DATA
Color 50***		PERFECT DATA
Color 50**		PERFECT DATA
Color 50*		PERFECT DATA
Color 50		PERFECT DATA
Color 25***		PERFECT DATA
Color 25**		PERFECT DATA
Color 25*		PERFECT DATA
Color 25		PERFECT DATA
Color 12.5***		PERFECT DATA
Color 12.5**		PERFECT DATA
Color 12.5*		PERFECT DATA
Color 12.5		PERFECT DATA
Color 6.25***		PERFECT DATA
Color 6.25**		PERFECT DATA
Color 6.25*		PERFECT DATA
Color 6.25		PERFECT DATA
Color 3.125***		PERFECT DATA
Color 3.125**		PERFECT DATA
Color 3.125*		PERFECT DATA
Color 3.125		PERFECT DATA
Color 1.5625***		PERFECT DATA
Color 1.5625**		PERFECT DATA
Color 1.5625*		PERFECT DATA
Color 1.5625		PERFECT DATA
Color 0.78125***		PERFECT DATA
Color 0.78125**		PERFECT DATA
Color 0.78125*		PERFECT DATA
Color 0.78125		PERFECT DATA
Color 0.390625***		PERFECT DATA
Color 0.390625**		PERFECT DATA
Color 0.390625*		PERFECT DATA
Color 0.390625		PERFECT DATA
Color 0.1953125***		PERFECT DATA
Color 0.1953125**		PERFECT DATA
Color 0.1953125*		PERFECT DATA
Color 0.1953125		PERFECT DATA
Color 0.09765625***		PERFECT DATA
Color 0.09765625**		PERFECT DATA
Color 0.09765625*		PERFECT DATA
Color 0.09765625		PERFECT DATA
Color 0.048828125***		PERFECT DATA
Color 0.048828125**		PERFECT DATA
Color 0.048828125*		PERFECT DATA
Color 0.048828125		PERFECT DATA
Color 0.0244140625***		PERFECT DATA
Color 0.0244140625**		PERFECT DATA
Color 0.0244140625*		PERFECT DATA
Color 0.0244140625		PERFECT DATA
Color 0.01220703125***		PERFECT DATA
Color 0.01220703125**		PERFECT DATA
Color 0.01220703125*		PERFECT DATA
Color 0.01220703125		PERFECT DATA
Color 0.006103515625***		PERFECT DATA
Color 0.006103515625**		PERFECT DATA
Color 0.006103515625*		PERFECT DATA
Color 0.006103515625		PERFECT DATA
Color 0.0030517578125***		PERFECT DATA
Color 0.0030517578125**		PERFECT DATA
Color 0.0030517578125*		PERFECT DATA
Color 0.0030517578125		PERFECT DATA
Color 0.00152587890625***		PERFECT DATA
Color 0.00152587890625**		PERFECT DATA
Color 0.00152587890625*		PERFECT DATA
Color 0.00152587890625		PERFECT DATA
Color 0.000762939453125***		PERFECT DATA
Color 0.000762939453125**		PERFECT DATA
Color 0.000762939453125*		PERFECT DATA
Color 0.000762939453125		PERFECT DATA
Color 0.0003814697265625***		PERFECT DATA
Color 0.0003814697265625**		PERFECT DATA
Color 0.0003814697265625*		PERFECT DATA
Color 0.0003814697265625		PERFECT DATA
Color 0.00019073486328125***		PERFECT DATA
Color 0.00019073486328125**		PERFECT DATA
Color 0.00019073486328125*		PERFECT DATA
Color 0.00019073486328125		PERFECT DATA
Color 0.000095367431640625***		PERFECT DATA
Color 0.000095367431640625**		PERFECT DATA
Color 0.000095367431640625*		PERFECT DATA
Color 0.000095367431640625		PERFECT DATA
Color 0.0000476837158203125***		PERFECT DATA
Color 0.0000476837158203125**		PERFECT DATA
Color 0.0000476837158203125*		PERFECT DATA
Color 0.0000476837158203125		PERFECT DATA
Color 0.00002384185791015625***		PERFECT DATA
Color 0.00002384185791015625**		PERFECT DATA
Color 0.00002384185791015625*		PERFECT DATA
Color 0.00002384185791015625		PERFECT DATA
Color 0.000011920928955078125***		PERFECT DATA
Color 0.000011920928955078125**		PERFECT DATA
Color 0.000011920928955078125*		PERFECT DATA
Color 0.000011920928955078125		PERFECT DATA
Color 0.0000059604644775390625***		PERFECT DATA
Color 0.0000059604644775390625**		PER

ACCESSORIES

KST		
3780	\$75.00	TANDON
S251 H	\$84.00	10MB internal hard
Advantage Board 128K	\$80.00	Rm 100 2 full height
V/D Plus II	\$24.00	ETAC
Premier	\$35.00	FD 518 half height
Ranch	\$25.00	TECMAR
Six Pack Plus 3046	\$25.00	Captain Board (OK)
Six Pack Plus 448 w/ Software	\$24.00	Compaq Master Base
		MegaByte Master Base

MODEMS Address Manager
Magic Spell, or Word Spinner

17000	225.00	Number Stamps on Reader
(Comps)	184.00	RECA
	11.00	Reze Building
27	84.00	Jim Fox
12000	343.00	SCAMBOODS
12008	CASL	Build a Book About You
12008 w/alt swtches	325.00	Macintosh
2400	583.00	SHOSTAK
300	128.00	Agent 001 in Fortis Tracks
	265.00	SIMON AND SCHUSTER
		Tramps
2400 w/alt swtches	308.00	SPINNAKER
	518.00	Amazon on Dragon World
		Kid Writer or Story Machine
		Snapcar Image 1 or 2
		Trains
	375.00	SPRINGBOARD
	275.00	Music Maestro
	275.00	
	275.00	

EDUCATIONAL SOFTWARE **Trade Runner**
CDS SOFTWARE

ATI		Falcom
Self Builder Programs	24.00	Murder by the Dozen
Training Power Programs	43.00	PARASOFT
BARROWS		Brain Loss
Computer Self in Great	53.00	NATDEN
BIOMED RESEARCH		Body Guard
THE WORKS (2 SELF or HW)	145.00	Sargen III
CBS SOFTWARES		INFORMIX
Country's Bridge	43.00	Confessions in Sexuality
Governing the Self	54.00	Enchantments: Witches, Wards, & Witches' Guilds in Furburton
CINEX		Diary
All programs	48.00	Quackery in Jaffed

[illegible]

BUSINESS SOFTWARE

85.00	ALPHA	
	Data Base Manager II	154.00
70.00	Electric Deal	182.00
20.00	Raymond's	48.00
74.00	ANALYTICAL	
	Bullseye	295.00
46.00	ANDERSON BELL	
45.00	AS/400	258.00
	APPL. SOFTWARE TECHNOLOGY	
	Nortel Net 32	53.00
27.50	1575	
	D Base 10.13	259.00
	D Base 10.13	CALL
	Framework I I.	348.00
72.00	SPY	
	Job Casting	375.00
	Business Programs	284.00
78.00		
	Business Graphics	212.00
70.00	Overhead Expans	123.00
18.00	BATTERIES INCLUDED	
	Electronic Checkbook	44.00
21.00	RECURRING	

GAMES	Schlich	27.50
	Schlich was contacted 1 E	22.10

	Superspy 1.0	24.00
	Techs B007 3.0	53.00
	Techs B007 3.0 w/ICO	60.50
	Techs B007 3.0 w/ICO	71.00
	Techs Power 3.0	24.75
	Techs Power 3.0 w/ICO	57.00
	Techs Tactix 1.0	75.00
	Techs Tutor 1.0	18.00
	UNLATCH/THROU	
	Time Line	229.00
	BRIGHTSTAR ROBERTS	
	Grfx's Purview	67.50
	BRIDGEVIEW	
	Bank Stock Writer	46.50
	Print Shop	CALL
	COMPUSEQUE	
	Literature Subscription Kit	15.00
	Write-It-Go	24.00
	COMPUCONNECT SOFTWARE	
	Fransky Base	98.00

Send coupon and list of items desired to:

DISCOUNT BY MAIL DEPARTMENT

NAME _____

Address _____

City _____ State _____ Zip _____

Phone No. or above address _____

Check items of payment

☐ Visa ☐ MasterCard ☐ C.O.D. ☐ Personal Check

☐ Certified Check ☐ Money Order

Card No. _____ Exp. Date _____

Personal and company checks allow 7 weeks to clear. For faster delivery, and earlier's check, certified check, or money order. Shipping—\$600 (\$25.00 minimum). Shipping—domestic orders ship 2-10 business days; international—\$10.00 Alaska, Hawaii, Canada, PW, APN, and LPD \$1.00 minimum. Foreign orders—\$11.00 minimum and 15% of all orders over \$100.00. Insurance and Tax. Minimum insurance cost, and expiration date. Connecticut residents add 4.75% sales tax. Virginia residents add 5.75% sales tax. All orders must have a return address. Delivery times are estimates only. Orders may be delayed due to weather conditions. Induction merchandise available until stock runs out. No net guarantee responsibility. All sales are final. "Comparable substituted price" does not include typographical errors as the part of other readers as prices that do not reflect higher shipping costs, small unit changes, or membership fee. The \$1 off after only applies to those where Shoppers' price is not already the lowest. Find information regarding our returns policy.

***Top rated in a leading consumer magazine

Our professionals

If you seriously shop around for the best priced computer hardware, software, and services, you've probably talked product and price with a PROGRESSIVE MICRO DISTRIBUTORS' professional. If you haven't, you've been depriving yourself and your company of a beautiful professional relationship. Here's why.

WE MEAN BUSINESS.

By focusing on details, PROGRESSIVE MICRO DISTRIBUTORS provides business buyer's with the criteria needed to make informed purchasing decisions. Our professionals give you expert advice on current computer and peripheral applications. Quote you prices that make good business sense. Inform you about specials on overstocked items. Make sure that each system is burned-in and fully tested overnight before being shipped. And follow your order from the moment it's processed until it reaches its final destination.

Furthermore, if a problem does occur, you won't be left dangling. Direct access to our customer service and technical support centers is available daily. Whether you need a product repaired or replaced, factory authorized technicians and customer service specialists are standing by to quickly resolve any problems you might experience.

HOW TO KEEP UP WITH PROGRESSIVE.

It's easy. With the Microgram, our monthly customer newsservice, you'll gain insights on new products and receive money saving incentives. And we'll keep you posted on specials and current prices with our monthly price lists. Lists are shipped automatically with all system orders and are available on disk. In addition, FREE UPS shipping is guaranteed on all prepaid orders with confirmation of current pricing.

To receive your current price list immediately, just call PROGRESSIVE MICRO DISTRIBUTORS today. TOLL FREE 1-800-446-7995. And remember... for professional service every time, call the professionals at PROGRESSIVE MICRO DISTRIBUTORS.



POLICIES

1. We accept VISA, MC, AMEX; No surcharge for VISA or MC.
2. COD requires cash or certified check; Company check when approved.
3. Allow 1 week for personal and company checks to clear.
4. Wiring information available upon request.
5. Corporate, Government and Institutional volume purchase agreements available.
6. Call for exact shipping charges; air shipments take priority.
7. If we must split shipment, you incur no additional shipping charges.
8. All orders shipped insured — No additional charge.
9. All products fully warranted; Some up to 5 years.
10. All items subject to availability; Prices subject to change without notice.

FOR ORDERS

1-800-446-7995

CUSTOMER SERVICE

1-404-446-7996

ORDERING INFORMATION

1-404-446-7995

TECH ASSISTANCE

1-404-446-7997

HRS: 9AM-9PM EST. SAT. 12N-5PM EST.

©1985 AT&T Information Systems.
IBM is a registered trademark of the International Business Machines Corp.

Introducing the New High Performance



From **\$1995**

- 6 or 8 MHz (80286 Processor)
- One Megabyte RAM (1024K)
- One 1.2 Megabyte Floppy Drive
- Compact Floppy/Hard Drive Controller
- 132 watt Power Supply
- AT Type Keyboard
- Out performs the original AT
- Available with 20 or 30 mg Seagate or CMI high performance hard drives

From **\$795**

- 640K Memory on Mother Board
- Floppy Drive Controller
- One 360K Floppy Drive
- 135 watt Power Supply
- Keyboard

RUNS 16 to 20% FASTER
Available in various configurations.

Call for best price on your needed configuration.

COLOR and MONOCHROME MONITORS

1. **RGB Ultra-High Resolution** — **\$399**
Built-in 801swivel base IBM Color Graphics Adapter compatible 14" screen, 640 x 200 res, 31 dot pitch.

2. **RGB Ultra-High Resolution** — **\$399**
Top of the line 13" anti-glare screen with outstanding graphics

3. **RGB High Resolution** — **\$349**
Multipurpose color monitor for most micro-computer applications 13" anti-glare screen with 43 dot pitch

4. **Green Screen, TTL Monitor** — **\$129**
IBM mono card compatible. Looks and works like IBM mono monitor 12" non glare, high contrast screen



Screen image simulated

Multifunction



Card

- 384K Memory
- Clock/calendar
- battery back-up
- Parallel, Serial, and Game Ports
- RAM Spooler and RAM Disk software

ALLOY PC-SLAVE 16



PC on a card 16 bit slave board transforms an inexpensive terminal into a fully functional PC when linked to another PC. 512K RAM Very fast processor.

CALL!

MONOCHROME GRAPHICS CARD



\$129

- Emulates standard IBM Mono/Color Graphics Card
- Includes Hercules Graphics compatibility
- Includes standard Printer Port

Local Area Network



Low cost way to link PCs, allowing users to share data and equipment. Installed configuration on twisted pair cable. Cable and software included.

\$299

The EDGE Color & Monochrome "Do Everything" Graphics Card



\$279

- 80 & 132 column formats
- High resolution graphics
- Color & 16 shades mono
- Emulates IBM Mono Card, Hercules, Plantronics Color
- Runs color graphics on monochrome monitors
- Standard printer port
- Software included

COLOR GRAPHICS CARD



\$129

- 5 1/8 inch short slot on IBM XT
- Emulates standard IBM RGB Card
- Standard Printer Port

Window DOS

\$49⁹⁵
Interactive DOS Utility

Order Toll Free **1-800-433-5355**

Pop-up windows give you instant access to many enhanced DOS functions from inside the program you are running. And then return you instantly to where you started.

- Quickly search for any file, any time.
- See up to 85 files per screen page.
- Check space left on your disk while running a program.
- Never again have a DIR command scroll files off your screen.
- Easily copy, erase or rename files.
- Send printer codes from within program you are using.
- Password lock your computer.
- And much more!



"WindowDOS quickly established itself as an indispensable part of my PC environment. I can't imagine working without it."

Paul Bonnar, Reviewer, PC Week



Window DOS

\$49.95
Plus \$5 Shipping/Shipping
1-800-433-5355

Texas 214 264-2636

Money orders, cashiers checks, VISA, MC, AmEx and corporate purchase orders

Compare WindowDOS with its competition in these 20 important categories!

	WindowDOS	Standard DOS	16B	XT/AT	StarLine DOS	StarLine Version
Works under another program	Yes	No	No	Yes	No	No
Display Overlay	Yes	No	No	Yes	No	No
Non-Blocking	Yes	No	No	Yes	No	No
Find any file on hard disk	Yes	No	No	Yes	No	No
Copy, erase or rename file	Yes	No	No	Yes	No	No
Search file across partitions	Yes	No	No	Yes	No	No
Backup file copy or print	Yes	No	No	Yes	No	No
Change file attributes	Yes	No	No	Yes	No	No
Change without auto-reboot	Yes	No	No	Yes	No	No
Custom file extensions	Yes	No	No	Yes	No	No
Display VMS/386	Yes	No	No	Yes	No	No
Check free space on disk	Yes	No	No	Yes	No	No
Display file in EBCI format	Yes	No	No	Yes	No	No
Display file in ASCII format	Yes	No	No	Yes	No	No
Check for on-line and disk	Yes	No	No	Yes	No	No
Send printer control codes	Yes	No	No	Yes	No	No
Screen display printer	Yes	No	No	Yes	No	No
Password lock computer	Yes	No	No	Yes	No	No
Screen image feature	Yes	No	No	Yes	No	No
Utilities	No	No	No	Yes	No	No
Cost	\$49.95	\$24.95	\$25	\$49.95	\$24.95	\$24.95

Many features missing! (The network is available from another program.)
What StarLine doesn't do, WindowDOS does. They work together as perfect companions. No other utility can compare with the many fine features found in WindowDOS.

Software of the Future, Inc.
P.O. Box 531650 Grand Prairie, Texas 75053

WindowDOS Interactive DOS Utility Program for IBM PC XT, AT and true compatibles. Requires DOS 2.0 or newer and 80 column display. Uses only 40K of memory. All brand names listed above are registered trademarks.

TCS

TEXAS COMPUTER SYSTEMS

Toll Free **1-800-433-5184** Texas 214 264-8511

Mail Order Computing Since 1980 • D & B Rated • Major corporate PO's accepted.

Heart of Texas Computer Systems, Inc.
P.O. Box 531158
Grand Prairie, Texas 75053

**Now
with 18 Month
Hard Drive Warranty**
on all hard drives

Hard Disk Systems

FREE with each kit: the powerful WindowsDOS Utility Software
which includes a Head Parking feature. \$50 value. See ad on next page.

PC, XT, & compatibles	AT & compatibles	CMI 18 month warranty	Seagate 13 month warranty
10 Meg \$379	20 Meg \$595	\$649	
20 Meg \$479	30 Meg \$749	\$799	

Kits include drive, controller, cables, hardware, & easy instructions. Systems are individually tested and backed by our warranties of 12 or more months.



For combo floppy/hard drive controller, add \$75.

AT drives have fast 38ms access time. AT kits include rails, cables & instructions. AT drives use controllers in computer. Buses from Hard Disk.



Streaming Tape BACKUPS

INTERNAL

10 Meg	Extrix Spool	\$399
20 Meg	Extrix or Gemco Cassette	\$699
23 Meg	Microsystems Cartridge	\$699
60 Meg	Extrix or Gemco Cartridge	\$888

EXTERNAL

20 Meg	Extrix or Gemco Cassette	\$749
25 Meg	Microsystems Cartridge	\$849
60 Meg	Extrix or Gemco Cartridge	\$1095

MT25 \$849



25 Megabyte Tape Back-up

- Uses no slots on PCs, XT's. Just plugs in external floppy controller connector.
- Portable - Back-up several PCs by simply moving back-up and plugging in or individual files.
- Uses popular DQ600A cartridges, giving unlimited storage capacity.
- Has 6 month warranty.

AT Controller Card **\$129**
Only needed for AT computer

Emergency Power Systems

Don't take chances on power failure taking your important data.

- Self contained battery
- Auto recharging
- Instant activation
- Plugs in standard outlet

200 watt (10 min)	\$269
200 watt (35 min)	\$299
425 watt	\$449
1000 watt	\$999

Power Supplies

For added power when upgrading your PC



\$89	\$119
135 watt	150 watt

Quantity discounts available!

Internal Modem \$225

300-1200 Baud, Hayes compatible. for PC, XT, AT. Includes software.

ANCHOR MODEMS	
Express	\$275
300-1200 Baud, 100% Hayes compatible	
Mark 12	\$219
300-1200 Baud, Hayes compatible	
Volkamodem 12	\$179
300-1200 Baud, Hayes compatible	
Volkamodem	\$49
300 Baud, Bell 103 compatible	

Floppy Drives for Apple IIe, IIc

• Plug in and run **\$149**

TRANSFER SWITCHES

Double up your equipment

2 position	\$75
2X switch	\$108

Other configurations available

- We have lowest prices. Compare
- No surcharge on VISA, MC.
- Prompt shipping. Free on many items. Call.
- Finest service! Your full satisfaction is our goal!

We offer lowest prices on PRINTERS

FUJITSU DotMax 9	\$349
180 cps, near tractor, NLO mode	
FUJITSU DotMax 24	\$1495
24 wire, 240 cps, near tractor, True LO	
PANASONIC 1091	\$258
120 cps	
PANASONIC 1092	\$366
180 cps	
PANASONIC 1093	\$436
15 in carriage	
PANASONIC 3151	\$412
15 in DW	
OKI 6000	\$199
Daisywheel 10 cps	
OKI 6100	\$359
Daisywheel 18 cps	
OKI 6300	\$679
15 in 40 cps	
OKI 2200	\$299
Typewriter/Printer	
STAR (Gemini) SG-10	\$225
15 in	
STAR (Gemini) SG-15	\$379
15 in	
STAR (Radix) SR-15	Call
200 cps	
OLYMPIA KO	\$289
Daisywheel	
OLYMPIA NP	\$279
160 cps, near tractor	

Call for quantity prices! We can't be beat!

Brand names represent registered trademarks. Prices are final. Returns for restocking require authorization. Product specifications and availability are subject to error or change without notice.

- \$100 minimum purchase required.
- All merchandise is new, with manufacturer's warranty.
- We accept cashiers' checks, money orders, VISA, MC, C.O.D. and approved corporate PO's. For American Express, add 3%.

"Dac-Easy Accounting is a genuinely amazing deal."

PC Magazine, October 15, 1985

"I've never before in a review come right out and told readers to buy a product, but I'm doing it now. Dac-Easy is an incredible value."

PC Week, August 27, 1985

"Amazing". "Incredible". "Unbelievable". That's how the industry's most important reviewers describe Dac-Easy Accounting — Dac Software's feature-packed, fully integrated accounting package priced at only \$69.95. They compare it favorably to accounting packages (sold module by module) costing up to five thousand dollars!



Seven powerful, integrated modules

But it's more than our price that has the critics raving. Compare our features to those of any other account-

ing package at any price.

Dac-Easy Accounting offers instant access to General Ledger, Accounts Receivable, Accounts Payable, Inventory, Purchase Order, Billing and Forecasting. Perfect integration between all seven modules gives you fast, accurate, flexible management of information. Data entered once is automatically posted to all pertinent modules. And Dac-Easy is designed to manage both product and service oriented businesses.



Three-year history maintained, with forecasting

Only Dac-Easy maintains a three-year history on all principal files, and provides spreadsheet-like forecasting based on this history.

Plus, you can generate any of 300 different reports for instant access to the exact information you need.

Find out for yourself why Dac-Easy is the fastest selling accounting package in history. Call us today!

Dac-Easy Accounting

\$9.95

"Dac-Easy is remarkable, amazing, revolutionary, sensational..."

Computer Buyer's Guide & Handbook
September 1985

PARTIAL LIST OF FEATURES

General Information

- Menu driven
- Password protection
- File capacity limited only by disk space
- Support contract available

General Ledger

- Unlimited multi-level accounts
- Three-year account history for CRT inquiry
- Pencil and pen feature to correct mistakes
- Unique budgeting routine
- CRT transaction inquiry
- Activity report, trial balance, financial statements, unlimited departments and journals

Accounts Receivable

- Open invoice or balance forward
- Customized aging report
- Unlimited number of customers
- Flexible mailing labels and directories
- Supports partial payments & finance charges
- Three-year customer history for number of invoices, sales, costs, and profits

Accounts Payable

- Customized statements
- Cash flow analysis/sales analysis
- Automatic sales forecasting

Accounts Payable

- Check printing with multiple invoices and cash available routines
- Aging reports with seven customized columns
- Unlimited number of vendors
- Flexible mailing labels and directories
- Three year vendor history
- Unlimited allocations per invoice

Inventory

- Supports average, last purchase, and standard costing methods
- Powerful physical inventory routines
- Accepts any unit of measure
- Three-year product history in units, dollars, cost, and profits
- Automatic forecast of product sales
- Automatic pricing assignments
- Alert and activity reports with 11 sorts
- CRT shows on-hand on-order committed sales/cost/profit items (CPI)

Purchase Order

- Inventory and non-inventory items
- Allow up to 99 lines per PO
- Per line discount in %
- PO accepts generic discounts freight taxes/insurance
- PO accepts back orders and returns
- Purchase journal

Billing

- Send or inventory invoicing on plain or preprinted forms with remittance
- Prints sales journal
- Alerts when credit memo

Forecasting

- Unique program that automatically forecasts using your three-year history
- Revenue and expense accounts
- Vendor purchases
- Customer sales, cost, and profit
- Inventory item usage
- Forecast by source, last year or % base from last year, or trend, or least square trend line analysis method



"EDITOR'S CHOICE"
PC MAGAZINE

"Despite its low price, Dac-Easy includes a lot of extras that you wouldn't expect to find even in a more expensive package."

Bill Machrone, Editor
PC Magazine, October 15, 1985

"This is an incredibly good value."

InfoWorld, September 23, 1985
Rated 4 disks

To Order Call Toll Free

1-800-431-0800

Ask For Operator 2011A

For More Information

214-458-0038

Dac software, inc 4801 Spring Valley, Rd.
Building 110-B, Dallas, TX 75244

Send in this coupon with your credit card number, money order or check for \$69.95 plus \$7.50 for postage and handling. In Texas, add 6 1/2% sales tax (\$4.28). U.S. prices only.

☐ CHECK ☐ MONEY ORDER
☐ AMEX ☐ VISA ☐ MASTERCARD Expires _____

Account No. _____

Name _____

Company Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

Signature _____

30-Day Money Back Guarantee: dac software, inc. provides a 30-day money back guarantee that all claims and features listed in this ad are true.

Minimum Hardware Requirements:
IBM (PC, XT, or AT) or other compatibles, 128K memory, one 5 1/4" DSD floppy disk, 132 column printer in compressed mode, 80x24 CRT, MS-DOS[®], PC DOS[®] 2.0 or later.

[®]Trademarks of International Business Machines Corporation
[®]Trademark of Microsoft Corporation

Dac-Easy Accounting

2011A

"We're giving away 1,000 computers to prove a point about the MASTERFLIGHT™ mass storage system."



The XT Giveaway.

In fact, buy our MASTERFLIGHT and we'll give you a Kamerman Labs XT™ at no extra charge! It's our way of demonstrating that MASTERFLIGHT is the finest mass storage system sold. PC Tech says, "After testing all 14 tape drives, the authors concluded that... Kamerman Labs units are the clear winners."

This is it!

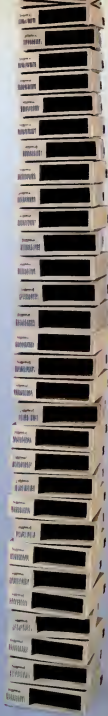
Inside the MASTERFLIGHT, you've got everything you need. A high performance hard disk system with up to 60 megabytes of storage. A 60 megabyte streaming tape drive that backs up 10 megabytes in just 2½ minutes,

"approaching the theoretical maximum speed possible for the hardware..."

That's not all, add a power director, surge protector, noise filter, security lock and you've got it—packed into a 2½" high unit that "can fit easily above the computer without raising the monitor to skyscraper levels..."

Take it away.

Kamerman Labs' reputation for quality, service and price can't be topped. By any measure, we beat the competition. Phone today for more information. Don't forget to ask about our XT's, internal hard disks and tapes, and accelerator boards.



ORDER TODAY

Call 800-522-2237, Oregon and Alaska call 503-626-6877. Domestic inquiries ask for Dept. 435. International inquiries ask for Dept. 213

Compare:

Vendor	Product	Capacity in Mbytes	XT Tape	XT Giveaway	Power Director	Surge Protector	Security Lock	1/2 Height Enclosure	Price
Kamerman Labs, Inc.*	Masterflight 20-60	20	60	Yes	Yes	Yes	Yes	Yes	\$2,495.00
Concus Systems, Inc.*	TLC Trinitas Combo*	20	60	No	No	No	No	Yes	3,295.00
Talgrass Technologies Corp.*	Hardfile 5025P	25	60	No	No	No	No	No	3,950.00
Seuran*	ORISYS*	20	60	No	No	No	No	No	3,495.00
Mountain Computer and*	FileSafe*	20	27	No	No	No	No	No	3,195.00
Kamerman Labs, Inc.	Masterflight 30-60	30	60	Yes	Yes	Yes	Yes	Yes	Call
Kamerman Labs, Inc.	Masterflight 40-60	40	60	Yes	Yes	Yes	Yes	Yes	Call
Kamerman Labs, Inc.	Masterflight 60-60	60	60	Yes	Yes	Yes	Yes	Yes	Call

IBM XT Compatible Kits

XT4171	64k system unit, keyboard	\$599.00
XT4172	XT4171, 640k, 1 floppy drive and controller	799.00
XT4173	XT4172, monitor, monochrome card	Call
Internal hard disk systems and tape systems from		599.00



3% service charge for credit cards
XT Giveaway Offer expires March 31, 1986
Pricing subject to change without notice

CIRCLE 238 ON READER SERVICE CARD

Kamerman Labs

7861 SW Cirrus Drive, Beaverton, OR 97005
(503) 626-6877 Telex 501 886

IBM XT is a registered trademark of International Business Machines. Masterflight™ and Kamerman Labs XT™ are trademarks of Kamerman Labs, Inc.
Signa Designs, Inc. and Teconar also mentioned. PC Tech, Nov 1985 **PC Tech, Nov 1985

© 1985 Kamerman Labs, Inc.



What's Inside

An idiosyncratic look at 1985's best and worst products, megamemory boards, AI for the PC, and copy protection are a few of the hot topics covered in this issue.

Sometimes it seems like we never get out of the Labs. If we're not testing AT compatibles, we're torturing printers or dissecting word processing programs. Sure, we live and breathe benchmark results, but every once in a while we like a change of pace.

When the first memo about this issue's Best of 1985 cover story went out to the staff, everyone heaved a sigh of relief. Here, finally, was a chance to lock up the Labs, retreat to our offices, and play purely subjective, no-holds-barred favorites. It was a once-a-year opportunity to be perverse—to applaud the products we love even if they won't win standard performance medals. To find out what Bill Machrone, John Dickinson, Frank "Derf" Derfler, and the rest of the gang consider the best of 1985, turn to page 107.

Memories...

Meanwhile, back at the Labs (we can't keep ourselves away for long), we recently devoted our energies to a project that's been on the back burner for a long time: memory boards. Since the first few expanded memory boards showed up last spring at COMDEX, this article has been appearing on editors' lists—and then disappearing. At first, we couldn't get our hands on any memory boards, and then, without warning, they started to pour into our offices.

Each time we thought we had assembled them all, a few more boards would show up. Technical editor Craig Stark finally closed the floodgates, and we called in Charles Petzold, Winn Rosch, and Phil Wiswell to review the bounty. Their as-



sessments of the boards appear on page 120, along with the first clear explanation we've seen of the difference between expanded and extended memory and why it's important to know one from the other.

What 1986 Will Bring

PC-based artificial intelligence will be a major topic in 1986. We didn't need to consult an oracle to make that prediction—our mailboxes are already stuffed with press releases hyping new programs claiming to incorporate AI. We asked Jeffrey Rothfeder, author of *Minds over Matter: A New Look at Artificial Intelligence*, for some insights (page 139).

Rothfeder convinced us that these programs just don't qualify as intelligent: The "brute-force" programming techniques they embody make your PC merely appear to think for itself. The future does hold exciting developments in mainframe artificial intelligence, but it will be some time before they can be ported down to the PC.

Intelligent or not, brute-force programming can produce impressive results. Several AI-influenced applications are powerful and useful. Ansa Software's *Paradox*, a database manager reviewed in this issue by Frank Derfler, is a good example (page 153). The first intriguing thing about *Paradox* is its financial backing. Venture capitalist Ben Rosen, who has a reputation for making good investments—he helped bankroll Lotus and Compaq—put his money behind Ansa. The second is Ansa's claim that *Paradox* uses "machine reasoning," a form of artificial intelligence.

It looks as though Rosen made another canny investment. Derf liked *Paradox* so much he nominated it for Best of 1985. But it was *Paradox*'s myriad built-in functions and powerful data-handling capabilities that impressed Derfler, not its much-hyped machine-reasoning feature.

Our Battle-Scarred Reporters

Some of our regular contributors took on unusual assignments for this issue. Communications expert M. David Stone reviewed a modem that transmits via radio waves instead of phone lines (page 184). Contributing editor Jared Taylor took on a particularly dangerous assignment: a report on the latest skirmishes between software developers and end users on the copy-protection battlefield.

This sensitive subject is almost too hot to handle, and we were tempted to avoid it altogether. But it's a topic readers constantly ask us about. For an account of mind-boggling new copy-protection and data-encryption schemes and reports on five copying programs, turn to page 164. ■

Ven-Tel's Half Card™ modem is in all the best computers. Here's why...

Ven-Tel gives you lots of reasons to buy our Half Card™ modem for your IBM PC or compatible. The Half Card™ is a complete system that lets you communicate with other PCs, mainframes, and databases effortlessly. It includes Crosstalk-XVI® software. It's reliable. It's got all of the features you want. And it's a good value.

Do You Own One of These Computers?

Chances are you do. And if you're thinking of buying a modem, consider the Half Card™. Because of its small size, the Half Card™ fits in more computers, including all of the models we've listed here. The Half Card™ is small, so it fits in short slots or long. That means you can save your long slots for other expansion uses.

Effortless Communication

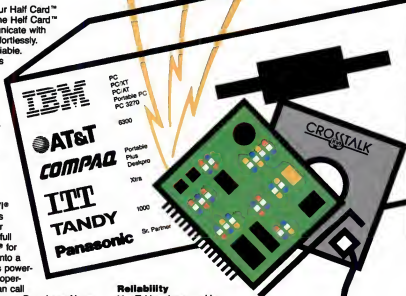
Each Half Card™ comes with Crosstalk-XVI® communications software, by Microstuf. It's the easiest to use, whether you're a beginner or an old hand, and the most powerful. A full on-line help menu makes using Crosstalk® for the first time a snap. It can turn your PC into a terminal on a mainframe computer with its powerful terminal emulation feature. It will even operate your PC when you're not there. You can call into an information service such as The Source or Dow Jones News Retrieval, or transfer files and electronic mail, all at the touch of a button. The Half Card™ connects your computer to the world. Effortlessly.

More Modem for Your Money

When you buy the Half Card™, you don't need anything else. The Half Card™ is a complete communications package that includes a full-featured modem and the best known software on the market. Complete easy-to-understand instructions with full technical support on installation and use. And a very competitive price. The Half Card™, with Crosstalk-XVI® software, retails for only \$549.

Features

- 1200/300 baud auto-dial, auto-answer.
- Uses the industry standard "AT" command set.
- Runs with virtually all communications software, including Smartcom II and PC Talk III and integrated packages such as Symphony and Framework.
- Includes Crosstalk-XVI® software.
- On-board speaker and extra phone jack for easy switching from voice to data mode.
- Selective tone or pulse dialing; full or half duplex.
- Automatic answer on any ring.
- True ring or busy signal detection.



Reliability

Ven-Tel has been making modems for 10 years. Our experience shows. Ven-Tel's Half Card™ only has about 70 parts, compared to almost 300 on other modems. We reduced the parts by building the first LSI modem chip using advanced switched capacitor technology. What that means to you is greater reliability and lower power consumption, so you can load up your PC with expansion boards and not worry about heat or power problems. And we back the Half Card™ with a full two-year warranty on parts and labor.

You Can Buy the Half Card™ Anywhere

You can get the Half Card™ at Computer Land, Businessland, the Genra Group, Entré Computer Centers, Macy's Computer Stores and other fine dealers nationwide. Also from Ven-Tel: the 1200 Plus™, an external modem and the PC Modem 1200™, an IBM internal with V.22 international capability.

Effortless Communication

Ven-Tel Inc.

2342 Walsh Avenue
Santa Clara, CA 95051
(408) 727-5721



**APPEARING
ONCE
EVERY
500
YEARS...**



...COMING SOON

Few mortals
have seen one
Be one of the
first.
call...

**1-800
362-
4449**

THE HARD DISK
DRIVE MARKET
WILL NEVER BE
THE SAME AGAIN



Permanence Data Incorporated
10000 E. 15th Avenue, Suite 100
Denver, CO 80202

CIRCLE 521 ON READER SERVICE CARD

009

INSTANT GRATIFICATION

Pop-Up 8 Powerful Tools, Including A Word Processor, Any DOS Command—Even Your Favorite Application—At The Touch Of A Key

A. SATISFIED CUSTOMERS ARE THE BEST FORM OF ADVERTISING—LISTEN TO WHAT POP-UP™ DESKSET™ USERS SAY:

*New York Times, Erik Sandberg-Diment—*When it comes to overall ease of use and efficiency, Pop-Up DeskSet Plus is probably the winner.

*Computer Buyers Guide & Handbook, Paul Rothweiler—*DeskSet Plus rates and gets from CBG & H the highest of marks.

*InfoWorld—*DeskSet has taken the Sidekick idea a step further.

Byte, Mark Welch—I found DeskSet's Pop-Up Calculator to be the best for office work.

*PC World, Danny Goodman—*Financial Calculator is the height of functionality. Perhaps the best feature of Pop-Up DeskSet Plus is the Clipboard when used in tandem with a recent addition called Pop-Up Anything.

*Business Software—*Pop-Up PopDOS is an almost necessary addition to the operating system.

*Computer Retailers' Guide, Mick Taylor—*The DeskSet is a very powerful set of tools that is both flexible and easy to use.

*Online Today, Ernest Mau—*Pop-Ups add flair to operations and enhance computer utility.

*Cummins Engine Co., Ivan Myers—*Much better than the competition (know anyone who wants to buy a "Sidekick"? \$25).

*J. P. Edmunds—*It is so good, your computer is not complete without it.

*Hewlett-Packard, Samson Espartero—*Very impressed with automatic/timed program execution.

*Atlantic Richfield Co., Craig Parker—*For the first time I can use my printer options!

*On the Wing, William Gross—*Outstanding!

State Law Library, Austin, Texas, Jim Hambleton—I find PopDOS very helpful in arranging documents on my data disk when using WordStar.

*Planning Research Corp., William Hand—*It is a big help in keeping me on schedule.

*IRT Corporation, Jack Wilson—*Very useful and easy to learn and use

B. COMPARE POP-UP DESKSET WITH WHAT THE COMPETITION OFFERS—NO OTHER DESKTOP PACKAGE EVEN COMES CLOSE!

	Pop-Up DeskSet	Sidekick™	Spotlight™
Automatic word wrap	YES	No	No
Word processor files	YES	No	No
unformatted in use	YES	No	No
Search and replace	YES	Yes	No
Block commands (copy, move, delete)	YES	Yes	No
Key strokes required to paste 20 lines of numbers into spreadsheets	6	52	Can't
Adjustable margins	YES	Yes	No
Scheduler message size	UNLIMITED	30 char	35 char
Alerts you to appointments	YES	No	No
Month watch (elapased time feature)	YES	No	No
Start programs at specific time (unattended operation)	YES	No	No
Display time constantly	YES	No	No
Date stamp documents	YES	No	No
Calculator has on-screen and portable tape	YES	No	No
Does financial calculations (interest, annuities, etc.)	YES	No	No
Statistical analysis mode (standard deviation, etc.)	YES	No	No
Allow user access to any DOS command	YES	No	No
Allow user to run any program while within another	YES	No	No
Set up printer while in an application	YES	No	No
User printer as electronic typewriter	YES	No	No
Auto dial phone numbers	YES	Yes	No
Transfers memory RAM resident	YES	No	No
Load only what you want expand as needed	YES	No	No

*PC Tech Journal, Ted Forgeron—*Sidekick has been banished from my hard disk to a dark corner of my Flip-n-File.

*Robert Newman—*Excellent—meets my needs better than Sidekick.

*David Gleason—*It's great for dBase development to be able to print, rename, view files without exiting.

*Professional Business Equipment, Inc.—*Works very well on a multiuser environment. Customers have been very impressed. We expect to sell them with many of our systems.

C. POP-UP DESKSET IS THE RIGHT CHOICE—AT THE RIGHT PRICE Pop-Up DeskSet gives you Pop-Up Word with Scheduler and cut-and-paste, Alarm Clock, Calendar, Standard and Financial Calculator, Phone Dialer, PopDOS Utilities and Pop-Up Anything—enables you to run a second application anytime. All non-copy protected, and all for \$69.95* (Sidekick is \$84.95 for less).

Step up to Pop-Up DeskSet and save 50% Turn in your Sidekick and we'll send you Pop-Up DeskSet for \$35—that's ½ off!

Pop-Up DeskSet is more than one computer and save 50%!

Popular Programs, Inc. offers a multiple computer licensing plan that gives you ½ off on up to 10 additional copies of Pop-Up DeskSet. Your company needs more than 10? Call 206-822-7065 for further information.

Why you'll want to spend \$60 more if you have a Hayes-Compatible Modem

Pop-Up DeskSet Plus has something no other desktop package has: Pop-Up TeleComm, a high-speed telecommunications program. And like all the Pop-Ups, TeleComm is available instantly—at the touch of a key, \$129.95*



Here is Lotus 1-2-3 with Pop-Up Alarm Clock and Calculator



Here is Pop-Up Word demonstrating cut-and-paste capability, with import from Lotus 1-2-3 highlight

TELECOMMUNICATIONS

Available any time (at a telephone line and at a locally based service to applications program)	Pop-Up TeleComm	Software Signposts	SmartComm™	Cost
Send and receive text and binary files	YES	No	No	\$129.95*
Have on-screen baud rates supported	YES	No	No	No
Have on-screen baud rates supported	300-1200	No	300-1200	\$129.95*
Have on-screen baud rates supported	2400	No	2400	\$129.95*
Have on-screen baud rates supported	110-9600	No	110-9600	\$129.95*
Have on-screen baud rates supported	YES	No	No	No
Have on-screen baud rates supported	YES	No	No	No
Have on-screen baud rates supported	YES	No	No	No

Use our toll-free number to order direct

1-800-44-POP-UP
(1-800-447-6787)

Available through 500 DEALERS coast-to-coast and through major distributors

POPULAR PROGRAMS, INC.

Formerly Bellsoft, Inc.
135 Lake Street, Suite 180, Kirkland, WA 98033
(206) 822-7065 Telex via WU 650267/172 MC
System requirements: IBM PC XT AT 520/80, PC compatible
Resolution: screen requires a PC AT or 520/80
Pop-Up Plus 1.0: Check for updates of Popular Programs, Inc.
Sidekick is a trademark of Borland International
SmartComm is a registered trademark of Hayes Microcomputer Products, Inc.
© 1988, TeleComm is a registered trademark of TeleComm, Inc.
Signposts is a trademark of Lotus Development Corporation

\$10 FOR FULL FEATURED 90-DAY EVALUATION

*Prices quoted are for U.S. only

CIRCLE 103 ON READER SERVICE CARD

HAUPPAUGE

Our 287 FAST/5
Gives your IBM PC/AT
A Lesson in Speed.



Now, When the Subject Turns to Fast Math, Your AT Will Get an A+.

Right now, the 80287 math Coprocessor in your PC/AT runs at 4MHz. Which means there's room for improvement. That's why Hauppauge has developed the unique 287 FAST/5—a module that gives your AT an unmatched 5MHz capability. Speeding up your math computations by 25%. Now that's an A+ performance! To insure easy installation, we've created a carrier mount for our 287 FAST/5. Just plug the module into your PC/AT's 80287 Numeric Coprocessor socket. No expansion slot required.

products listed below, you can get Recalc for only \$49 (suggested retail price is \$95).

87 CHIP \$129
Our 8087 Math Coprocessor for the IBM PC, PC/XT and PC compatibles.
87-2 CHIP \$229
8 MHz Math Coprocessor for

Compaq Desk-Pro and Olivetti PC's.

287 CHIP \$249
80287 Math Coprocessor chip that runs at 4MHz in the IBM PC/AT.
287 FAST/5 \$249
Our 80287 Math Coprocessor enhancement module that boosts speed in the IBM PC/AT to 5MHz.

1-2-3 GETS A LESSON IN SPEED, TOO!

Introducing Hauppauge's New Lotus Support

In addition to our 287 FAST/5, Hauppauge has recently developed a Lotus 1-2-3 support package that can accelerate your calculations up to 30 times. The package! Our 8087 coprocessor chip and Recalc™ software. Recalc links your Lotus 1-2-3 program to the fast math capability of our 8087 chip. By sending numeric operations to the 8087, computation time can be reduced from 60 seconds to as little as 2 seconds. And the more complex the calculation, the more time you save!

Affordability

We've raised the speed limit for Lotus 1-2-3 and lowered the cost of Recalc software. When you buy any of the Hauppauge

Now Available! The 287 FAST/8 \$379

In addition to our 1-2-3 support, we're introducing our new 287 FAST/8—a module that gives your IBM PC/AT an unprecedented 8 MHz capability. Doubling the speed of your math calculations! (module pictured above)

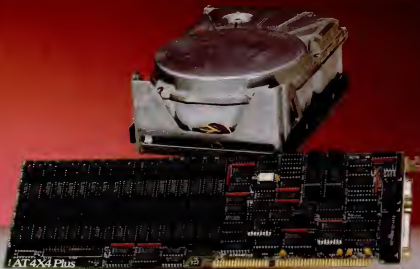
Hauppauge's 287 FAST/5 and Lotus support package are teaching the IBM PC, PC/XT and PC/AT a thing or two about fast math. Learn more by calling us today—or contact your local computer dealer.

Hauppauge Computer Works

358 Veterans Memorial Highway, Suite MSI
Commack, New York USA 11725 (516) 360-3827

Available from your local computer dealer

BLOWN FULL



Our 1-2 Punch Lets You Create The Ultimate (And Affordable) Enhanced AT.

Your AT is no toy - it's a serious piece of computing equipment which requires the finest in peripherals to unleash its power. Qubie' ATKits are the solutions to turning an unenhanced IBM AT or compatible into a supercharged system which will run circles around the IBM "Enhanced" models. For thousands less than the difference between a basic and an Enhanced 20 or 30 megabyte AT, we will give you more memory, extra I/O ports, and a bigger, faster, hard disk.

THE DREAMBOARD:

AT4X4Plus. This one picks up where other multifunction cards leave off. The most memory: up to 4 megabytes available. More I/O ports: parallel and serial port standard, three more serial ports optional. More flexible: runs on computers at up to 10MHz clock speed, optional game port available. Top Quality: Made in America to exacting specifications.

MORE PONIES UNDER

THE HOOD. A computer that chews up data like an AT, needs a hard disk with the capacity and the speed to supply the data fast. Our BT44 hard drive has a formatted

capacity of 44 megabytes, substantially more than IBM's offerings.

IS IT FAST? We tested our BT44 drive with Core International's disk test program (they are the folks selling 40 Mb drives for the AT for \$2595). The results of their "Average Access Time for Random Test" was an amazing 25.97 milliseconds. The synopsis at the end of the tests summed it up best: "This is the ultimate in hard disk performance. It exceeds all IBM specifications by more than thirty percent for the PC-AT."

YOU CAN'T LOSE. With our famous 30 Day "No Risk Guarantee", your satisfaction is assured. We even pay the return freight if you are not completely satisfied. Our crack tech support staff is here to answer any questions you might have during installation or operation. And if anything breaks, our 48 hour turnaround policy will have you back up in no time.

ATK-1 AT4X4Plus w/512K RAM & BT44 drive \$1295
ATK-2 AT4X4Plus w/1MB RAM & BT44 drive \$1395

ATK-3 AT4X4Plus w/2MB RAM & BT44 drive \$1895

AT4X4-RAM (Expands 2MB to 4MB) \$395

AT4X4-2S Second serial port \$40

AT4X4-SER (Expands 2 serial ports to 4 serial ports) \$129

For fastest delivery, send cashier's check, money order, or order by MasterCard/Visa. For personal checks, allow 18 days to clear. Company purchase orders accepted, call for prior authorization. California residents, add 6% sales tax.

Hours: M-F 9am - 5pm PTZ
Sat 9am - 12pm PTZ

London (01) 223-4969
Paris (01) 321-6316
Sydney (02) 679-3322
Canada (403) 434-9444



Outside California
800-821-4479

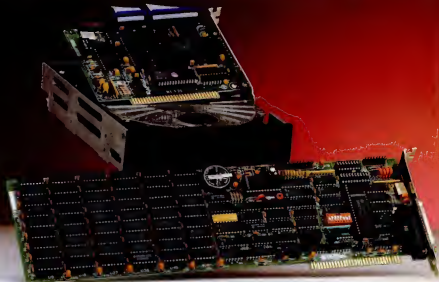
Inside California
805-987-9741

QUBIE'

Department P
4809 Calle Alto
Camarillo, California
93010

CIRCLE 235 ON READER SERVICE CARD

FULL BLOWN



Turn Your Basic PC Or XT Into A Powerhouse With A Qubie' XTKit.

Savvy buyers have long been aware that they can save money by buying a single drive PC or XT and add their own multifunction card and hard disk. Now you can get our two most popular add-ons together at our lowest price ever.

THE GIANT KILLER. The BT6Plus has all the features you expect of a multifunction card; 384K of memory, serial and parallel ports, battery powered clock/calendar, and optional game port (\$20). You also get print spooling and RAM disk software. We've sold thousands of this board to large corporations, universities, and government agencies more interested in performance and value than a flashy name. At our regular price of \$197.50, it's a real bargain; in this package, it's a steal.

QUBIE' PC20 HARD DISKS offer the best available combination of performance, ease of installation, and reliability. But don't just take our word for it. Listen to the experts:

"The user manual is the best written and organized of those reviewed....it's bargain-basement

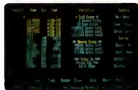
price, excellent documentation, drive replacement policy, and changeable interleave, may be the best deal going." PC WORLD 8/85

"Rugged construction, and DOS simplifying software (1dir) make the Qubie' hard disk add-in a standout." PC PRODUCTS 12/84.

"Installation is easy. The documentation walks you through the entire process... We found the Qubie' consistently performed faster than the Microscience drive, shaving as much as one-third off the times in a series of access time tests... Considering the performance and money back guarantee, we have to rate the Qubie' PC20 a special value because of its relatively low price." INFO WORLD 9/16/85.

Full reprints of these reviews available upon request.

NOW INCLUDED: ZyINDEX, the hard disk librarian. The special Qubie' version scans your hard disk looking for words or phrases you specify. Retrieves and displays the file in just seconds. It's a real "super searcher".



1 dir is a "Software Shell" that organizes your hard disk's files and subdirectories. Sort files by name, date, size, or extension. Create turnkey systems with your own custom menus. Features like password protection, block file copying and erasing, and Online help files for DOS increase your productivity. **1 dir** takes the wonder out of hard disks!

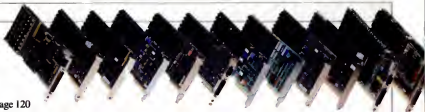
XTKit-1 \$699:

BT6Plus with 384K memory, serial, parallel, clock, BTDRIVE and BTSPPOOL software. 1 year warranty.

Qubie' PC 20 includes: 20 Megabyte hard disk, 5.25" controller, cables, Installation and User's Guide, **1 dir** and **ZyINDEX** software. 1 year warranty.

XTKit-2 \$1449

PC44 (same as PC20 with 44Mb., 28ms., full-height drive), and BT6Plus with 384k.



Modems Take to the Airwaves..... 184
M. David Stone/The EStem Model 84 Wireless Modem connects to your PC through a serial port just like any standard external modem. The resemblance ends there, however. To communicate with another Model 84, it converts your computer's digital output to FM radio signals, transmits them via a built-in radio transceiver, and then reconverts the returning signals to digital output.

New Looks for Replacement Keyboards..... 203
Winn L. Rosch/Keying in hours of text is a long, exhausting process, but the future may bring new keyboard designs to ease the pain. Three forward-looking companies have given us the world of tomorrow today: The Wico Computer Smartline SmartBoard incorporates a trackball, Key Tronic's KB 5153 adds a touchpad, and the Maltron Keyboard, type KIBM, uses a startling layout.

SOFTWARE
Is There Intelligent Life in the PC?..... 139
Jeffrey Rothfeder/The phrase "artificial intelligence" has begun to appear on more and more software packages, but many users are confused about the validity and implications of that claim. Are smart programs like *Q&A* and *Logic-Line Series I* just examples of clever brute-force programming? This look at PC-based artificial intelligence also examines the future of AI research.

SPREADSHEET CLINIC..... 235
Jared Taylor/Time conversions with *1-2-3* and *Symphony*, macro-making macros, and more.

POWER USER..... 239
Craig L. Stark/dBASE statistical functions, power footnotes in *Microsoft Word*, and more.

USER-TO-USER..... 247
Paul Somerson/Faster arrays, user-defined BASIC maximum and minimum functions, and more.

PC TUTOR..... 257
Charles Petzold/Answers to queries on the XT/370 and security concerns.

Paradox: A Database Manager with a Familiar Face..... 153
Frank J. Derfler, Jr./Paradox, a heavy-duty database management system, borrows the best from leading programs and then goes them one better. You'll recognize 1-2-3's two-line menu interface and cell format as well as dBASE III's structured programming features.

Creating Corporate Training Courseware..... 197
Jon Pepper/Authoring systems give nonprogrammers the tools to create sophisticated courseware and software tutorials. The VASCO Concurrent Authoring System runs interactively and concurrently with other programs, furnishing an excellent environment for devising software tutorials. The more complex McGraw-Hill Interactive Authoring System creates PC-based courses using such features as interactive video.



ISSUES
The Copy-Protection Wars..... 164
Jared Taylor/Software vendors claim the right to protect their investments by copy-protecting their products. But end users assert the conflicting right to protect their investments by backing up the same software. The battle between vendor and user interests is quickly escalating into a full-fledged war.

REVIEWS IN BRIEF..... 263
David Obregón/The Roland MB-142 Monitor, ACL's Electrostatic Locator, and the LABLMAKR.PC program.

THE SHORT REPORT..... 267
Phil Wiswell/1985 product reviews that never made it into print.

NEW ON THE MARKET..... 269
David Obregón/A color film recorder, an addressable touch panel, a fully integrated voice recognition and response system, and more.

PC:MART..... 280

PC BLUEBOOK..... 282

READER SERVICE CARD..... 293

PRODUCT INDEX..... 297

BOOK REVIEW
Learning Pascal..... 301
Charles Petzold/Exploring Pascal addresses entry-level Pascal programming, while *Complete Turbo Pascal* and *Using Turbo Pascal* are geared toward experienced Pascal programmers.

INDEX TO ADVERTISERS..... 307

COMING UP..... 309

Cover Photo: Racanne Giovanni

FEATURES



COVER STORY The Best of 1985 (and Some of the Worst)..... 107

Honoring the tradition of ringing out the old before ringing in the new, *PC Magazine* takes a fond look backward. We asked our editors and writers to nominate the PC-related products they consider The Best of 1985. And since we couldn't resist poking fun at the year's more outrageous turkeys, we've included some tongue-in-cheek "Worst Product" nominations.



HARDWARE Enlarging the Dimensions of Memory 120

Charles Petzold, Phil Wiswell, and Winn L. Rosch/Good news—your software's style need no longer be cramped by the 640K-byte limitation. Two methods now break that memory barrier: extended memory and expanded memory. Although both schemes add multiple megabytes of storage, the techniques they use are very different. Extended memory, available only on PC ATs and compatibles, builds a potential 15 megabytes of RAM on top of the existing 640K bytes. Expanded memory, available for PCs and XT's, uses a simple bank-switching scheme to pack more memory into the same space. *PC Magazine* explains the differences, offers a quick-decision guide, and benchmarks 12 boards.

COLUMNS/DEPARTMENTS

WHAT'S INSIDE 15

Behind the scenes at *PC Magazine*.

PC NEWS 33

Nine pages of up-to-the-minute news reports, product minireviews, interviews, short features, and commentary.

FROM THE EDITOR'S SCREEN Substandard Brands 61

Paul Somerson/What the software industry needs is a good 5-cent standard interface. It would spare users the frustration of a mixed-up word processor like one of those reviewed for our upcoming special issue on word processing by maintaining a consistent, universal set of commands.

LETTERS TO PC MAGAZINE... 65

Readers share their insights, comments, and criticisms.

THE NORTON CHRONICLES A Reader's Thoughts on Ye Perfekt PC 81

Peter Norton/A reader's response persuades Norton to reconsider his hardware picks for the PC owner.

PC PERSPECTIVES Graphics with No Apologies..... 89

Jim Seymour/New graphics programs with *MacPaint*-like designs and CAD-like features that may actually work better on a personal computer than on a mainframe.

COMPUTERS IN SOCIETY Can Computers Be Fail-safe? ... 97

Stan Augarten/The Pentagon's plans for computerized war include the Strategic Defense Initiative—better known as the Star Wars defense system. But given the prevalence of hardware and software bugs, is this latest military scheme really such a good idea?

PROGRAMMING/UTILITIES Sizing Up Your Files 221

Art Merrill/DOS utilities such as the CHKDSK, TREE, and DIR commands don't always give you the actual size of your files. SIZE and FREE are two programs that will tell you exactly how much space you have.

In the business software jungle ...



there can only be one leader.

Quietly adhering to our belief that Running Is Believing,[™] Macola, Inc. has become the leader in Financial Software. From single to multi-user environments—all things considered—power, ease-of-use, cost and support—you can't buy better software. That's what leading is all about.

It really is a software jungle out there.

Software packages hit the marketplace daily. From companies with track records shorter than a safari. Miracle promises. Miracle prices. You'll quickly discover why you got the software at a miracle price when you call the company you bought it from and try to work out your problems with an answering machine.

What we suggest is a good guide with experience in the business software jungle.

The guide you'll get (if you have to call Macola—on our toll-free 800 lines)—is an experienced computer programmer ready to handle your specific questions.

Software with a past. Solid, reputable.

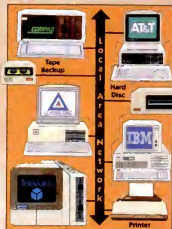
You can get state-of-the-art business software for micro-computers—backed with the finest credentials—from Macola, Inc. We've been leading the way for over a decade. We'll guide you past the pitfalls; help you make the right choice.

We've converted the packages of the leading independent developer of mini-computer software. Those packages are the *de facto* standard for minis. By retaining all the power and sophistication of the mini-software and by adding the features demanded by the more than 15,000 accounting, manufacturing and distribution businesses using our software, Macola has developed the *de facto* standard for micros. And we're still pushing.

Business software for all environments

Macola Financial Software—Accounts Receivable (A/R), General Ledger (G/L), Accounts Payable (A/P), Payroll (P/R), Purchase Order (P/O), Inventory Management

(I/M), Assets & Depreciation (A/D), Customer Order Processing (COP), Bill of Material Processor (BOMP), and Report Writer (R/W) is written for single, multi-user and LAN environments. Recognized by Big Eight accounting firms like Price Waterhouse, our packages can go on-line individually or as an integrated system and can be used by companies with one micro to those with thirty or more. In fact, using IBM PCs and Macola Financial Software, many LAN products currently available are more powerful—and much less expensive—than most mini-computers being sold today.



Software with a future. Sleek, fast, powerful.

Today's micro hardware can be pushed to the mini-limits. But only powerful micro-

software can generate that push. Macola Financial Software is compiled and runs under R/M COBOL Release 2.0



which has improved speed. But for our End Users, VARs and

System Integrators who all wanted much faster processing speed, we have also converted our packages to Micro Focus Level II COBOL. With Micro Focus and your IBM PC (or PC compatible) you can drive our business packages up to 400% faster! That means fewer processing problems and greater productivity for the End User.

The good guide always does what's necessary for the survival of his clients.

Dealers, VARs, System Integrators ...

Macola Financial Software will become an integral part of your computer package. Its modularity, ease of use, power and support services can help you place of lot of systems. Contact us about the many benefits of our Authorized Reseller Program. Here are our toll-free numbers...

1-800-468-0834 (Con't. U.S.A.)

1-800-468-0833 (Ohio only)

1-614-382-5991

Telex 5106002104 MACOLAUSA

MACOLA

FINANCIAL SOFTWARE

181 South Main St., P.O. Box 485

Marion, Ohio 43302

CIRCLE 263 ON READER SERVICE CARD

Macola, R/M COBOL, Micro Focus Level II COBOL, IBM PC, COMPAQ, AT&T, Leading Edge, and Televideo are registered trademarks.

The classic, definitive work on the IBM PC—now fully revised and enlarged by the world's leading expert on IBM microcomputers

PETER NORTON

Inside the IBM PC
ACCESS TO
ADVANCED
FEATURES
AND
PROGRAMMING

NEW!

From the renowned
IBM PC authority

PETER NORTON



• Now covers every model of the IBM micro PC, PCjr, XT, and the new AT!

• Updated and revised—plus 100 pages of new information!

• The most complete guide to the IBM PC available anywhere!

A **Brady** BOOK

\$19.95 at your book or computer store. Or order toll-free today

800-624-0023

In New Jersey 800-624-0024



PUBLISHER	William Lebow
EDITOR	Bill Machrone
EXECUTIVE EDITORS	Barry Owen, Paul Somerson
SPECIAL PROJECTS EDITOR	John Dickson
SENIOR EDITOR	Bill Howard
TECHNICAL EDITOR	Craig L. Stark
ASSISTANT MANAGING EDITORS	Laura Simons, Gus Verdine
MANAGER, COPY EDIT	Linda Lusk
ASSOCIATE EDITORS	Charles Bennett, Jennifer de Jong, Lisa Kleinman, Barbara Kromoff, Stephanie Stallings
SENIOR COPY EDITOR	Janet Lewis
PRODUCT TESTING EDITOR	Michael O'Connell
PRODUCTION EDITOR	Paul B. Ross
ASSISTANT EDITORS	Gerald Carney, Victoria Danoff, Virginia Dudek, Cheryl Goldberg, Jane Minant, David Olegren, Ann Overlow
COORDINATING EDITOR	Greg Pincus
EDITORIAL ASSISTANTS	David Baker, Christina Dyer, Christopher Johnson, Christina Okung, Paul M. Stafford, Al West
BUSINESS MANAGER	Iris Kamei
PROOFREADERS	Michael Cohn, M. Stephanie Ricks
TECHNICIAN	Charles Rodriguez
RECEPTIONIST	Freda T. Samuelson
CONTRIBUTING EDITORS	Richard Aaron, Frank J. Deffler, Jr., Glenn Hart, Steve Holmer, James Langdell, Stephen Manes, Peter Norton, Charles Petroski, Martin Porter, Wan L. Rosch, Craig Stinson, Jared Taylor, Robert Weintraub
ASSISTANT TO THE PUBLISHER	Suzanne N. Silver
DESIGN DIRECTOR	Peter J. Blank
ART DIRECTORS	Mary Zink, Gerard Kunkel
ART EDITOR	Mariano Niccio
ASSISTANT ART DIRECTORS	Monique Caffey, Hana Goodheart
LAYOUT ARTISTS	Natalie Cole, Susan McGee
ADMINISTRATIVE ASSISTANT	Jill Alexander
PUBLIC RELATIONS MANAGER	Jessica Kirey
PUBLIC RELATIONS ASSISTANT	Kimberly Humphries
SINGLE COPY SALES DIRECTOR	Bob Woltersdorf
ASSISTANT CIRCULATION MANAGER	Mickey Knepper
CIRCULATION COORDINATOR	Robert Snaith
ADVERTISING OFFICE	Ziff Davis Publishing Company, One Park Avenue, New York, NY 10016 (212) 505-5100
SENIOR AD PRODUCTION MANAGER	Roberta Thomas
AD PRODUCTION MANAGER	Patricia White
AD PRODUCTION ASSISTANT	Christine LaRocca
SENIOR EDIT PRODUCTION COORDINATOR	Rosemary Taylor
EDIT PRODUCTION COORDINATOR	Randi C. Fox

COMPUTER PUBLICATIONS DIVISION

PRESIDENT	Kenneth H. Koppel
VICE PRESIDENT, EDITORIAL	Jonathan Lazarus
VICE PRESIDENT, PRODUCTION	David Davis
VICE PRESIDENT, CREATIVE SERVICES	Herbert Stern
VICE PRESIDENT, CIRCULATION	Alicia Marie Pratts
VICE PRESIDENT, CIRCULATION SERVICES	James Ramsey
VICE PRESIDENT, MARKETING SERVICES	Ann Pollak Andrus
VICE PRESIDENT	Hugh Taylor
MARKETING MANAGER	Rosanne Sonnenberg
BUSINESS MANAGER	Gary A. Gansforn
EDITORIAL DIRECTOR	Ernest F. Baxter

ZIFF-DAVIS PUBLISHING

President Richard P. Fries Senior Vice Presidents Philip Siro, Kenneth H. Koppel Vice Presidents Roy Parris, Wilham Phillips, J. Malcolm Morris Treasurer Selwyn Tashman Secretary Bettina Abrams

PC: The Independent Guide to IBM Personal Computers ISBN 0-07-01908-2500 is published bi-monthly except in July and August for \$24.95 for one year (12 issues), \$41.95 for two years, and \$67.95 for three years. Additional postage for delivery outside the United States and other foreign countries. PC Communications Corp., a subsidiary of Ziff Davis Publishing Co., One Park Ave., New York, NY 10016. Second Class postage paid at New York, NY 10016 and at additional mailing offices. POSTMASTER: Address changes to PC: The Independent Guide to IBM Personal Computers, P.O. Box 2445, Secaucus, NJ 07094. Editorial and Business Office: One Park Ave., New York, NY 10016. Advertising: (212) 505-5100. For subscription inquiries and orders, write to PC Magazine, P.O. Box 2445, Secaucus, NJ 07094. PC Magazine is an independent journal, not affiliated in any way with International Business Machines Corporation. IBM is a registered trademark of International Business Machines Corp. Other names Copyright © 1984 PC Communications Corp. All rights reserved. Reproduction in whole or in part without permission is prohibited. The following are trademarks of PC Communications Corp.: PC, PCjr, The Independent Guide to IBM Personal Computers, PC Magazine, PC Star, PC, Laboratory, PC Link, PC Labs, PC Communications, Press PC, PC Times, PC Briefcase, User-to-User, PC Press, Press Link, Subscription Club, The PC Columns, PC Link Station. Periodicals Mailmark at the publication may not be reproduced in any form without permission. Requests for permission should be directed to Ann Landwehr, Ziff Davis Publishing Company, One Park Ave., New York, NY 10016. Editorial Communications should be addressed to NCTY Mail (212) 505-5100. PC Information Reader Service (212) 505-5100.



RaceCard-286 can give your IBM® PC or XT™ all the speed, power and performance of an IBM AT—with true reliability and at a fraction of the cost.

Simply plug RaceCard-286 into any short slot inside the PC and you're ready to run. There's no need for any kind of software modification. RaceCard-286 provides total compatibility with virtually all AT software, RAM and peripheral cards.

RACECARD IS FAST. FAST. FAST.

RaceCard-286 lets you run your software up to six times faster, using any standard PC/XT. That's because its CPU is 20% faster* than an AT's. An optional 80287 math co-processor is available to save time when using number-intensive software.

A WINNER FROM START TO FINISH.

Measuring 5" x 3.9" and consuming only 7 watts of power, RaceCard-286 is the only "speed-up" card that fits in any available short slot. Which frees up the long slots for other add-on cards.

For example, when you combine RaceCard-286 with Mountain's new DriveCard, a self-contained 10MB (\$1,095) or 20MB (\$1,195) 3 1/4" hard disk drive with controller on a single plug-in card, you can boost your system's overall performance beyond that of an enhanced AT—for as little as \$1,900.

RaceCard-286 also comes ready to support the 3COM Ether Series, Novell, IBM's PC/LAN, NESTAR, STARLAN™ and other networks.

ONE YEAR WARRANTY.

RaceCard-286 is one reliable performer. But if service is required, it's backed by a 12-month warranty featuring "Ready Replacement" within the first six months. If anything goes wrong, simply take it to your nearest Mountain dealer for service or return it to Mountain for replacement.

WIDEST RANGE OF STORAGE OPTIONS.

Mountain offers the industry's widest range of high-performance storage upgrades. Our field-proven FileSale™ internal and external disk, tape, Mini Mountain and combo systems are known worldwide for their outstanding value.

A ROCK-SOLID REPUTATION.

Mountain's hard-earned reputation among business users over the last eight years for responsiveness, innovation and reliability means we'll be there when you need us.

TEST DRIVE ONE TODAY.

Don't be left behind in the PC performance race. With RaceCard-286 under the hood, your PC will drive faster and perform better. Call for more information and the name of your nearest Mountain dealer.



Mountain.

THE PEAK OF PERFORMANCE

1-800-458-0300 (in Calif., 1-800-821-6066)

Mountain Computer, Inc., 360 El Pueblo Road, Scotts Valley, CA 95086, (408) 438-8650, TWX 910-598-4504. Mountain products are distributed and sold worldwide. Call or write for the name of the dealer or distributor nearest you.

*Not including I/O. *Registered trademarks and trademarks of Mountain Computer, Inc. and International Business Machines Corp.
© 1985 Mountain Computer, Inc.

CIRCLE 160 ON READER SERVICE CARD

not unbeaten in the dot matrix printer market, but its consistent quality at that speed is hard to match.

The Pacemark 2410 retains its correspondence-quality font, one that is amazingly good for a printer equipped with a 9-pin printhead. Newer correspondence-quality printers use a 24-pin printhead and produce even better results, but they don't usually achieve the big Okidata's print speed or have its newfound graphics compatibility.

The Pacemark 2410 is unquestionably the dot matrix printer of choice for any serious PC user.

—John Dickinson

FACT FILE: Pacemark 2410, Okidata, 532 Fellowship Rd., Mount Laurel, NJ 08054 (609) 235-2600 List Price: \$2,395
CIRCLE 633 ON READER SERVICE CARD

FOX AND GELLER'S QUICKINDEX

Fox and Geller's *QUICKINDEX* is one of those gems that does one simple task well: It speeds up the process of building an index for your *dBASE III* files (see "A Smorgasbord of Fox and Geller Enhancements for *dBASE III*," *PC Magazine*, Volume 4 Number 23). You can call *QUICKINDEX* directly from within *dBASE*, but for maximum speed, you can run the program from DOS.

This enhancement utility is so incredibly easy to use that you will barely need to refer to the documentation, but reading the entire three-page *QUICKINDEX* manual takes less time than backing up your XT's hard disk.

QUICKINDEX can index a file on one or more fields and can use the arithmetic operators to combine fields. It also supports 14 of the *dBASE* string functions for using parts of fields or concatenating strings.

How fast is it? A colleague of mine has a mailing list of nearly 23,000 names. Reindexing with *dBASE* took 53 minutes. Using *QUICKINDEX* with *dBASE* dropped the time to just 19 minutes. When he used *QUICKINDEX* directly from DOS, the reindex time was slashed to a mere 6½ minutes! The net result is an 88 percent timesavings through the use of a simple \$99 program.

—Alfred Poor

FACT FILE: *QUICKINDEX*, Fox & Geller, 604 Market St., Elmwood Park, NJ 07407 (201) 794-8883 List Price: \$99 Requires: 256K RAM, one disk drive.
CIRCLE 629 ON READER SERVICE CARD

SYMDEB (MICROSOFT'S MACRO ASSEMBLER 3.00)



I realize that it takes a certain mentality to get excited about a debugging utility, but in the world of debuggers, Microsoft's SYMDEB is a real beauty.

SYMDEB is a symbolic debugger included as a freebie in Microsoft's Macro Assembler 3.00 package; a 3.01 update was sent to all registered users. It looks and feels much like DEBUG but has a lot of added features. By reading in the MAP file generated during a LINK, SYMDEB correlates all public names with the memory addresses in the executable file.

All SYMDEB commands that take hexadecimal addresses also accept symbol names. When used with other Microsoft language products, such as its excellent C Compiler, Version 3.00, it can even display source lines (including comments) along with the unassembled code.

In addition to dumping bytes, SYMDEB dumps words, double words, and short, long, and temporary reals. Reals are displayed with the decimal equivalents. You can set ten sticky breakpoints and individually enable and disable them, or automatically perform

extra register or memory manipulation, even involving arithmetic expressions. It supports single-screen flipping and redirection for both SYMDEB I/O and the loaded program. Try that with DEBUG and see where it gets you!

SYMDEB has so much power that using plain old DEBUG now seems like going back to DOS 1.1. I just don't know how I managed to do efficient program development before I got it.

—Charles Petzold

FACT FILE: SYMDEB, Microsoft Corp., 10700 Northup Way, P.O. Box 97200, Bellevue, WA 98008 (206) 828-8080 List Price: \$150 (for complete Macro Assembler 3.0) Requires: DOS 2.0 or later.
CIRCLE 630 ON READER SERVICE CARD



THE GENIUS VHR VIDEO DISPLAY

The year 1985 was when I discovered The GENIUS VHR Video Display. Nobody else seems to know about it, but for \$1,500 you can have a screen with the long side up—just like a piece of paper. The specs should give any writer the shivers: 66 lines by 80 columns in crisp, razor-cut monochrome adapter-style characters and symmetric bit-mapped graphics à la Macintosh, 730 pixels across by 1,004 pixels high. The VHR is directly supported by *Microsoft Windows*, *GEM*, *AutoCAD*, *WordPerfect*, and many others. (I've patched Turbo Pascal and a few other things to use it as well.)

The VHR consists of a standard-length PC expansion card and a white-phosphor portrait-mode monitor. It operates either in 66-line mode or in IBM-compatible mode, which emulates both the Monochrome Display Adapter and the Color Graphics Adapter at the same time—monochrome on top, graphics on the bottom. High resolution is perfect; medium resolution can be quirky. No commercial software I know of fails to run in text mode.

The VHR is electronic paper. Any writer whose cranial bandwidth is greater than 25 lines should consider it.

—Jeff Duntemann

FACT FILE: The GENIUS VHR Video Display, MicroDisplay Systems Inc., 1310 Vermillion St., Hastings, MN 55033, (800) 328-9524, (612) 437-2233. List Price: Model 401 (text only), \$1,395; Model 402 (text and graphics), \$1,795. CIRCLE 622 ON READER SERVICE CARD

HAYES'S TRANSET 1000

The Transet 1000 is one of those gadgets that doesn't seem essential until after you buy it. Then you wonder how you ever did without it (see "Buffers That Boost Communications Potential," *PC Magazine*, Volume 4 Number 23).

Hayes's advertising has a tough time describing this gem because it has three different identities. It can be a printer buffer, connecting one computer to two printers; a printer buffer and communications buffer, sending files to a printer or modem and storing incoming electronic mail even when the computer is off or doing something else; or a poor man's networking device, connecting two computers to a single printer and sending files from computer to printer or from computer to computer.

Transet's best feature is concurrency—it can print



The GENIUS VHR Video Display

on two printers at once or print one file while sending another to MCI Mail or to the second computer.

My only complaint about Transet is that I can't set it up in all three ways at once. Now, if Hayes would make the box a little bigger and add a few more connectors. . . . —M. David Stone

FACT FILE: Transet 1000, Hayes Microcomputer Products Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092 (404) 499-8791. List Price: \$399; accessory kit for IBM PC (which contains configuration program and cable), \$39.95; cable for Transet to parallel printer, \$32.95; cable for Transet to Hayes modem, \$32.95. CIRCLE 627 ON READER SERVICE CARD

MICROSOFT WINDOWS

In American folklore Mark Twain is the champ in refuting a premature obituary. Most industry watchers,

this writer among them, declared *Microsoft Windows* stillborn the day IBM rolled out *Top View*.

Windows was conceived during the brief age when we all thought there would be a demand for high-performance MS-DOS machines that weren't locked into IBM's 8088 design. *Windows* was to be the translator that would allow software developers to really develop portable applications and free hardware manufacturers from worrying about software compatibility.

Like the host who continues to hang decorations for a party nobody plans to attend, Microsoft has continued development work in a way that seemed stubbornly futile.

The world is a much different place today. The availability from IBM of an EGA-equipped multimegabyte AT, not to mention the groundswell support for desktop aids like Borland International's *SideKick*, have changed the ground rules for software. Attention has moved from integrated software packages, like the late lamented *Vision* or the sadly disappointing *Symphony*, to software integrators.

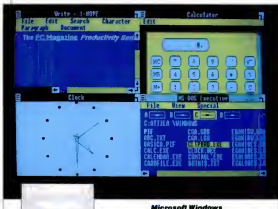
SideKick's ability to pluck text from 1-2-3 and plopping it into a word processor has whetted the user's appetite for integration without the implicit sacrifices of giving up one's trusted spreadsheet. The failure of all the integrated packages to replace 1-2-3 in the hearts and minds of its users is very simple: none of them.

Symphony included, had a spreadsheet as good or nearly as fast as 1-2-3. The lesson for the industry is that the benefits of integration are no reason to compromise on the quality of the components.

Windows in its new incarnation exacts few penalties for integration. It will allow you to run most of the popular application programs; its



Hayes's Transet 1000



support of 1-2-3 is particularly complete. *Top View* compatibility is *Windows* compatibility. Recently, I amazed a friend, who is a 1-2-3 devotee, by pulling a chart from one of the three copies of 1-2-3 that *Windows* was running simultaneously and pasting it into the middle of a report in the word processor.

The real importance of *Windows* is evidenced in native *Windows* applications. Early purchasers of *Windows* also receive a suite of applications programs including a very serviceable word processor, calculator, card file, print spooler, and a simple telecommunications package. These applications define a standard for applications development that eliminates the need for you to learn a different set of commands for each application and frees the software developer from having to worry about the peculiarities of a user's hardware and software configuration. What these programs do most, however, is make me wish for a 1-2-3 that was not only *Windows*-tolerant but *Windows*-smart.

It takes an EGA card to see the real *Windows*. In full color, *Windows* has the best font display of any PC software I have ever seen. *Windows* changes your view of what a computer can display. After an hour with *In-a-vision* (the first of the native applications to be offered for *Windows*), even the most devoted Macintosh user will be a convert. *Windows'* main drawback is that it won't run without a graphics display card of some sort; it's tolerable with a Hercules card, but the future is color.

In order to make *Windows* a big winner, Microsoft must convince software developers, including its own colleagues, to build *Windows*-based applications. This will be easier everyday as the word gets around.

The product of the year should represent a departure from the ordinary and a challenging step forward. *Windows* is all that and more: it's a productivity tool that can enhance current applications as well as show us the future.

—Jonathan Lazarus

FACT FILE: *Microsoft Windows*, Microsoft Corp., 10700 Northup Way, P.O. Box 97200, Bellevue, WA 98009, (206) 828-8080 **List Price:** Not finalized **Requires:** 256K RAM, two disk drives. **CIRCLE #17 ON READER SERVICE CARD**

SUBLOGIC'S JET

I've played a lot of video games in a lot of places—from beachfront bar rooms in west L.A. to mountain suds stops in Colorado to boardwalk arcades on the Jersey shore—but most of my game playing these days takes place at my desk, with my face plastered to the screen of an IBM Color Display. And in spite of the "slim pickin'" in computer games over the past year, I've managed to spend too many lunch hours teeing off with One Step Software's *Golf's Best: Pinehurst*, sauntering through enchanted lands with Sierra On-Line's *King's Quest: Romancing the Throne*, and—best of all—bumping up the skies with SubLOGIC's *Jet* (see "The Flight Stuff," *PC Magazine*, Volume 4 Number 21, page 38).

The vicarious pleasure derived from sending Sidewinders rocketing toward their MiG targets might be lost on most mature professionals. But when I wrap my fingers around a Gravis joystick and launch my on-screen F-18 Hornet off the deck of an aircraft carrier, I feel like I've got the right stuff to defend that little floating piece of America 20,000 feet below.

For me, the degree to which a player is drawn into the action or fantasy of any piece of entertainment software is one of the most important factors to consider when evaluating a game. *Jet* gets a high mark here. And if, in the act of being entertained, a player is



SubLOGIC's Jet

educated or enlightened, it's even more worthy of notice. While a few spins of *Jet* won't teach you to fly a plane, you may learn some basic cause-and-effect actions of flight.

But, most of all, I've enjoyed this bit of on-screen role playing, and that is reason enough for choosing *Jet* as one of the best products of 1985.

—Greg Pastrick

FACT FILE: *Jet*, SubLOGIC Corp., 713 Edgebrook Dr., Champaign, IL 61820, (217) 359-8482 **List Price:** \$49 **Requires:** 128K RAM, color/graphics monitor adapter, Hercules Graphics Card, or IBM Enhanced Graphics Adapter. **CIRCLE #18 ON READER SERVICE CARD**

CAMBRIDGE SPREADSHEET ANALYST

Even the spreadsheet manufacturers agree that debugging your worksheets is at least as important as constructing them in the first place. So how come they make it so tough?

Despair not. Send \$149 to the oddly named Cambridge Software Collaborative in the People's Republic of Massachusetts, and you'll get what may be the slickest piece of genuinely new software released in 1985.

Cambridge Spreadsheet Analyst sniffs around in your spreadsheet, traces your logic, and then tells you where it thinks you may have gone wrong. If you don't understand why it thinks a cell may be in error because you can't see the problem in context, just open a window and slide around that cell on your sheet to see where you went wrong. You can also ping-pong your way through others' mysterious worksheets, and to understand their intent and maybe even succeed in figuring out their logic.

Great screens, tidy printed reports, intelligent use of function keys, fast operation, 1-2-3-like menu lines, no more copy protection—and it saves us from ourselves. What more could you ask?

—Jim Seymour

FACT FILE: *Cambridge Spreadsheet Analyst*, Cambridge Software Collaborative, University Place, #200, Cambridge, MA 02138, (617) 576-5744. List Price: \$149. Requires: 192K RAM, two disk drives, DOS 2.0 or later. CIRCLE 621 ON READER SERVICE CARD

GRAPHIC COMMUNICATIONS' FREELANCE

As a self-confessed graphics junkie, I spend a lot of time paying through PC graphics programs. Unfortunately, most of what I see looks a lot alike.

PC graphics packages fall into two categories: the same old bar/line/pie-chart (SOBPLC) programs; and the Hamburger Helpers of the graphics world, such as *Dr. Halo* and *GraFIX Partner*. But what if I want to just draw something?

Freelance to the rescue. From Graphic Communications, whose *Graphwriter* is a serious contender in the SOBPLC market, *Freelance* leaps past the business-charts paradigm to let you create almost anything you can visualize on a computer screen. Think of it as *MacPaint* and *MacDraw* in one, running on a PC in high-resolution color.



Freelance is perfectly happy to draw business charts, but it can take them much further than any other mainstream PC graphics package, with drop shadows and other complex three-dimensional solids. It also lets you draw, say, a logo, store it, scale it up or down a few thousand times, and then rubber-stamp it into your other graphics.

Freelance isn't just one of the best new programs

I've seen this year; it's more fun than all the others put together.

—Jim Seymour

FACT FILE: *Freelance*, Graphic Communications Inc., 200 Fifth Ave., Waltham, MA 02254, (617) 890-8778. List Price: 256K RAM, \$395. Requires: 256K RAM; IBM Color/Graphics Adapter, Enhanced Graphics Adapter, or Hercules Graphics Card; one disk drive. CIRCLE 619 ON READER SERVICE CARD

COMPAQ DESKPRO 286

Maybe lightning does strike twice. Almost 3 years ago, COMPAQ not only brought out the first real IBM PC compatible but defied the odds by producing, in that tough leadoff spot, what turned out to be the best of the PC clones. With this year's COMPAQ Deskpro 286, Rod Canion's elves in Houston showed they hadn't lost their touch (see "The COMPAQ Deskpro 286," *PC Magazine*, Volume 4 Number 23).

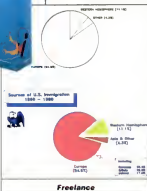
The D/286 handles memory expansion smartly: There are no RAM chips on the motherboard. All memory comes on 2-megabyte add-in boards—and the D/286 can handle 8 megabytes right out of the box.

The D/286 is fast. While AT owners were playing crystal-swapping roulette and trying to push their 6-MHz ATs up to 8 MHz (or faster, as Intel continues to ratchet the reliable speed of the 80286 up through 8, 9, 10, even 12.5 MHz), D/286 owners found their machines already came with 8-MHz crystals—and ran fine at higher speeds.

A decent keyboard, IBM EGA/EGA compatibility, trouble-free hard disks—by almost any measure, the D/286 is the best of the PC AT clones—better than the PC AT itself, for that matter.

—Jim Seymour

FACT FILE: COMPAQ Deskpro 286, COMPAQ Computer Corp., 20555 FM 149, Houston, TX 77070, (713) 370-0670. List Price: \$1,400 with 1.2-Mbyte disk drive, 256K RAM, monitor. CIRCLE 620 ON READER SERVICE CARD





COMPAQ Deskpro 286

FINALWORD, VERSION 2.0

FinalWord, Version 2.0, is for people who would really like to write their own word processor. Straight out of the carton, it's a full-featured program that does footnotes, windows, indexes, cross-referencing, multicolumn printing, and spelling checks. But its real power lies in its internal programming language, which lets you write your own word processing commands and attach them to any key.

You can use the language to set and reset flags, make if-then decisions, pass arguments, and even call other programs from DOS. If you need a command that capitalizes every third word in your document and then runs 1-2-3, all you have to do is write it. The language isn't easy to learn, but there's not much it can't do.

One thing it can't do is turn *FinalWord* into an on-screen for-



matter. The program can print your text in just about any way imaginable, but only if you include format commands in the text. *FinalWord* has several hundred format commands, and if that's not enough, you can write your own.

FinalWord is not for beginners. You'll spend many hours with the 500-page manual before you've written the real final word. But once you're done, you might have the word processor you've always dreamed of.

—Jared Taylor

FACT FILE: *FinalWord*, Version 2.0, Mark of the Unicorn, 222 Third St., Cambridge, MA 02142 (617) 576-2760 **List Price:** \$395 **Requires:** 192K RAM (256K for spelling checker and 448K for autocheck), two disk drives, DOS 2.0 or later. **CIRCLE 612 ON READER SERVICE CARD**

OBERON INTERNATIONAL'S OMNI-READER

Oberon International's Omni-Reader, a manually operated optical character reader, is a perfect example of large-scale technology—optical character recognition—scaled down into a practical and affordable tool for the PC (see "The Oberon Omni-Reader: Recognition Becomes Affordable," *PC Magazine*, Volume 4 Number 14).

Most optical character recognition scanners (OCRS) are marketed (and priced) for power users, with an emphasis on automating the entire data-entry process. The Omni-Reader is an unabash-



Oberon International's Omni-Reader

edly mom-and-pop peripheral, making the user part of the system: You feed the pages and guide the scanner. Once you get the knack, this process goes pretty quickly, and for some applications, it has advantages over larger OCRS.

Despite some flaws and a jacked-up price (\$799 from the original \$499), the Omni-Reader is an excellent bargain. Considering all the exotic new hardware available, this OCRS is a study in practical simplicity.

—Tom Stanton

FACT FILE: *Omni-Reader*, Oberon International, 5525 MacArthur Blvd., #630, Irving, TX 75038 (214) 869-9310 **List Price:** \$799 **Requires:** asynchronous communications adapter. **CIRCLE 626 ON READER SERVICE CARD**

The Pencept Penpad looks like a normal digitizing tablet, and it does, in fact, perform all the functions of any high-quality digitizing pad. What sets it apart is the 68000 MPU and the intelligence incorporated into ROM storage on its PC-compatible interface board. These assets let Pencept read handwritten printing.

The system works by decoding pen strokes. Some characters can be printed in three or even four ways, but Penpad almost always gets them right immediately.

Specific areas of the pad are designated for one-touch commands and other shortcuts. You can define 26 "pen macros" and activate a long series of commands with one simple action.

With optional *Pencad* software, Penpad works with the ubiquitous *AutoCAD* drafting program, making *AutoCAD* much easier and faster. Even jaded computer sophisticates will be impressed.

—Glenn Hart

FACT FILE: Pencept Penpad, Pencept Inc., 39 Green St., Waltham, MA 02154 (617) 893-6390 List Price: Penpad 320 with Pencept, \$1,495 Requires: 320K RAM, IBM Graphic display. CIRCLE 824 ON READER SERVICE CARD



Pencept Penpad

dot-per-inch resolution, a screen-size picture comprises more than half a megabyte of data. But *ColorScreenPrint* doesn't miss a single nibble.

—Stephen Manes

FACT FILE: *ColorScreenPrint*, Application Techniques Inc., 10 Lomar Park Dr., Pepperell, MA 01463 (617) 433-5201 List Price: \$79.95 Requires: Color printer. CIRCLE 825 ON READER SERVICE CARD



AMBER SYSTEMS' HOMEBASE

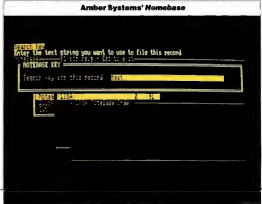
Make a list of features you want in a desktop organizer, and odds are that *Homebase* has them: DOS commands, a calculator that works with 26 variables in decimal or hexadecimal, a calendar with an alarm option, an editor that emulates *WordStar*, the ability to move information from one program to another, and a smart terminal program.

Homebase's most useful feature by far is its "notebase," an index-card filing system that's ideal for taking quick notes during a phone call. The notebase can keep track of different files for each client or project and let you load each as needed. Within a given file, a sophisticated search feature makes it easy to find information later.

At 167K bytes of RAM plus an overlay file on-disk, *Homebase* is large for a background program, but if you have a hard disk and the memory to spare, that's a small price for the features.

—M. David Stone

FACT FILE: *Homebase*, Amber Systems Inc., 1171 Saratoga Sunnyvale Rd., San Jose, CA 95129 (408) 996-1883 List Price: \$49.95 (plus \$5 shipping charge) Requires: 180K RAM, one disk drive. CIRCLE 823 ON READER SERVICE CARD

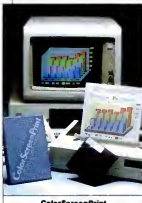


APPLICATION TECHNIQUES' COLORSCREENPRINT

A product whose name has not one but two internal capital letters arouses upper-case suspicions. This 48K-byte memory-resident program, however, is a capital product all the way.

Once you load *ColorScreenPrint*, it can grab just about any color image from just about any program and print it on just about any color printer (and the most popular monochrome dot matrixes). Hitting *PrtSc* during any application brings up the program's main menu. From there it's a snap to print all or part of the on-screen image, expand or contract it, and change colors (shading patterns in monochrome). You can also rotate the image 90 degrees, reposition it on the page, select the print density, and even change printer ports.

ColorScreenPrint insisted on swiping the on-screen colors of one program, but that was the only minor bug I found. The program brought out untold talents in my early model IDS Prism printer. I learned, however, that this kind of printing takes time and using a spooler doesn't help much. After all, at a 168-by-84-



ColorScreenPrint

SPRINGBOARD SOFTWARE'S NEWSROOM

Although the United States has a long history of fostering individual speech and thought, few products for the microcomputer have reflected this fine tradition. Springboard Software's *Newsroom* exploits the PC's ability to aid individual expression by creating newsletters, pamphlets, and advertisements.

From writing and laying out text and clip art to the point when the dot-matrixed galley comes chugging out of your printer, *Newsroom* brings microcomputer power to the people, with menu-driven ease. Though designed for teenagers who want to put out small publications, it also provides an outlet for the loudmouthed pigheadedness in which Americans of all ages love to indulge.

—Christopher Johnston

FACT FILE: *Newsroom*, Springboard Software, 7808 Creek Ridge Circle, Minneapolis, MN 55435 (612) 944-3915 List Price: \$59.95 (optional clip art \$29.95) Requires: DOS 2.0 or later. CIRCLE #10 ON READER SERVICE CARD

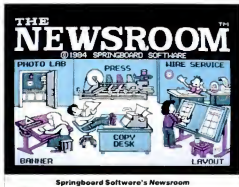
THE MACINTOSH AWARD FOR CREATIVE ICONOGRAPHY

Lenipen Graphics System is a full-featured graphics program that can produce some impressive effects, but its user interface should be sent back to the drawing board.

"Leni" is a large, bald, green head (The Jolly Green Giant? Mr. Clean after drinking his favorite cleaning product?) who has the annoying habit of bothering you when you're trying to think. If you don't enter a command for 30 seconds or so (I've mercifully forgotten the exact length of time), Leni moves his lips, makes beeping noises on your PC speaker, and writes on the last line of the screen, "Hello pal, I am waiting for more work." (Now I've got it—he's Big Green Brother.) What's worse is that Leni keeps



Lenipen Graphics System



Springboard Software's *Newsroom*

bugging you every 30 seconds until you give him a command. As a free-lance writer, I can sympathize with Leni's need to work, but I would never try bothering an editor that way.

Many of the icons in this program deal with Leni's face—would you believe that you have to put the cursor on Leni's right eyebrow (screen left) to put the menu on the left? Or touch the tip of the nose for line-printer

logging? Or the right side of Leni's forehead for help? And you thought icons were user friendly.

Lenipen is the best argument against icons that I have ever seen—which may ultimately be its strongest contribution to the computer industry.

FACT FILE: *Lenipen Graphics System*, Duncan-Atwell Computerized Technologies Inc., 1200 Salem Ave., Hillside, NJ 07035 (201) 355-1690 List Price: \$695 Requires: 256K RAM, one disk drive. CIRCLE #10 ON READER SERVICE CARD



Commodore's Amiga

THE JEKYLL/HYDE AWARD FOR SCHIZOPHRENIC HARDWARE

It is a rare pleasure to announce a single product that can stand head and shoulders above the competition as both best and worst product of the year—Commodore's new Amiga.

This machine has stereo sound, multiple voices, high-resolution color, a real keyboard, an actual disk drive, and an affordable price. Its Motorola 68000 microprocessor can even be adapted to run MS-DOS. I don't know if I can live without an Amiga much longer.

The Commodore Amiga, its handlers tell us, will be pitched as a business machine, an educational tool, a game computer, and a CAD/CAM workstation. If you think this is confusing, picture this: At its formal introduction before a crowd of Wall Street types and journalists from business publications, Commodore trotted out Andy Warhol to draw a picture on-screen of rocker Deborah Harry. Warhol and Harry didn't seem to know why they were there, which probably matched the feeling in the audience. I'm also afraid it will match the confusion among the buying public and the hardware- and software-development companies.

I may not be able to live without an Amiga—but what will I do with it when I get it? —Corey Sandler

FACT FILE: Amiga, Commodore Business Machines, 1200 Wilson Dr., Westchester, PA 19380 (215) 431-9100 List Price: 3½-inch floppy disk drive, RGB monitor, \$1,705 CIRCLE #15 ON READER SERVICE CARD

THE SOUPY SALES AWARD FOR MOST FRIVOLOUS SOFTWARE

He who laughs, lasts, . . . " says Steve Glauberman, the 28-year-old president of Enlighten. Glauberman expects his new software package, *Chuckle Pops*, to keep him laughing all the way to the bank. In fact, Glauberman sees *Chuckle Pops* as the pet rock of 1985.

Chuckle Pops is a RAM-resident joke file that displays humorous stories in pop-up windows on your screen—even if you are deep into a serious 1-2-3 worksheet. The colorful window is invoked with an Alt-J key combination (J for joke, get it?) and remains until you've shoosed it away with the Esc key—if you can stop laughing long enough to find the keyboard.

Unfortunately, one man's humor is another man's groan:

"My good man, aren't you ashamed to stand here on the street begging?" asked the properly dressed woman.

"What do you want me to do," the man demanded, "open an office?"

Other such knee-slappers abound. Are you likely to see the same jokes return as reruns? Not to worry. Glauberman plans additional volumes.

—David Obregón



Enlighten's *Chuckle Pops*

FACT FILE: *Chuckle Pops*, Enlighten, 205 N. Main St., Ann Arbor, MI 48104, (800) 447-1771, (313) 668-6678 List Price: \$14.95 Requires: 35K RAM, one disk drive, DOS 2.0 or later. CIRCLE #13 ON READER SERVICE CARD



THE JAWS AWARD FOR SOFTWARE DESTRUCTION

Highly touted new schemes for protecting software abounded in 1985. Fortunately, all were so dismal that the industry began to realize copy protection is more a nuisance to users than a security blanket for vendors.

Vault's *PROLOK Plus*, aka "Killer PROLOK," set a new low. Supposedly able to wreak havoc with an unauthorized user's data and hardware, this sharklike scheme seems to have gone belly up. The company's favorable comparisons of the program to the Vietnam War probably didn't help.

With the growing use of hard disks of all varieties, MicroPro and others quickly abandoned cute copy-protection methods in response to users' anguished howls. Copy-busting programs continued their hot sales pace among those to whom the word *key disk* is anathema.

—Stephen Manes

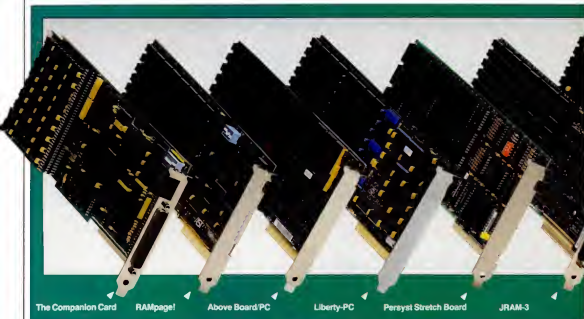
FACT FILE: For further information on *PROLOK Plus*, contact Vault Corp., 2649 Towngate Rd., #500, West Lake Village, CA 91361 CIRCLE #14 ON READER SERVICE CARD

In our book, some of the best of the year, for 1985 or any other year, are our authors. The journalists who contribute to *PC Magazine* bring hands-on experience, passion for computing, and a sense of humor to every story. The last two qualities, in particular, emerge when they wax eloquent on their favorite hardware and software, as the contributors listed below did in this issue.

Contributing editors: Frank J. Derfler, Jr., Glenn Hart, Stephen Manes, Charles Petzold, Winn L. Rosch, Jared Taylor.

Contributors: Jeff Duntmann, Alfred Poor, Robin Raskin, Corey Sandler, Jim Seymour, Tom Stanton, M. David Stone.

Editors: John Dickinson, special projects editor; Barbara Krasnoff, associate editor; Gerard Kunkel, art director; Christopher Johnston, editorial assistant; Jonathan Lazarus, vice president, editorial; Bill Machrone, editor; David Obregón, assistant editor; Greg Pastrick, coordinating editor.



ENLARGING THE

When your IBM PC programs used to bump their heads against the 640K-byte memory ceiling, there was not much you could do about it. Now there is. Two methods of breaking the 640K memory barrier now let you add multiple megabytes of storage.

These two methods are known as *extended memory* and *expanded memory* (not to be confused with *expansion memory*, which often refers to any additional memory added to a PC on an expansion board). Despite the unfortunate similarity in the sound of their names, the two methods are very different.

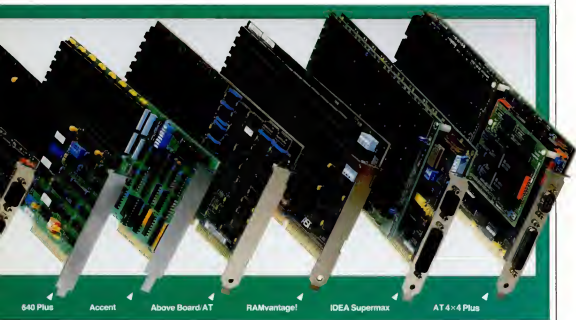
Extended memory adds a potential 15 megabytes to RAM. It is available only on PC ATs and compatibles because it uses features of the 80286 microprocessor chip in those machines. PC-DOS does not yet support extended memory; the only DOS program that can use extended memory is VDISK, IBM's virtual disk (or RAMdisk) program included with DOS 3.0 and later versions.

Expanded memory adds up to 8 megabytes to RAM. It was developed by three giants in the personal computer world—Lotus, Intel, and Microsoft—as a way to stuff more memory into ordinary PCs and XT's. (It may also be used on PC AT's.) Expanded memory incorporates a relatively simple bank-switching or paging scheme. Existing programs cannot take advantage of expanded memory, but new releases of several popular spreadsheet, database, and

integrated programs can use expanded memory if it is present.

If you're confused about extended and expanded memory, you're not alone. Let the subtle difference in the meanings of the two words help you out. Extended means making longer: The 15 megabytes of additional memory in the PC AT is above and beyond the memory available on the earlier PC models. Expanded means making larger, or just fatter: Expanded memory packs more memory into the same space. The difference between extended and expanded memory is the difference between a basketball player and a sumo wrestler.

The PC AT extended memory, while of very restricted immediate use in the PC-DOS environment, is obviously the long-term solution to memory limitations because it is based on the evolving architecture of Intel's microprocessors.



DIMENSIONS OF MEMORY

Expanded memory is a quick-and-dirty fix—what digital hardware engineers call a “kludge bag” stuck in the middle of an otherwise consistent memory structure. No one in his right mind could possibly love expanded memory per se. But it is so easy to implement and use that it will probably prove extremely popular, practically speaking.

If you know you need more memory right now without delay, you can flip to “The Quick-Decision Guide to Big Memory” (see the accompanying sidebar), check the reviews of products that follow, and dash to your nearest computer store. But if you need a more detailed explanation of extended versus expanded memory to clear up the confusion and uncertainty that surround them, stay tuned.

Conventional Memory

The 8088 microprocessor used in the IBM PC, XT, and PCjr can directly ad-

When your new programs demand huge chunks of RAM, you can choose between two very different alternatives—extended and expanded memory—to increase the megabytes at your command.

dress 1,048,576 bytes of memory, also measured as 1,024 kilobytes of memory, or 1 megabyte of memory. This memory is divided into three areas for specific functions (see Figure 1).

The highest 256K bytes of the total is reserved by IBM for read-only memory

(ROM). This area of memory includes the ROM BIOS (Basic Input/Output System) that runs the PC when it's first turned on and that supplies the routines through which other programs communicate with PC hardware, such as the display, keyboard, disk drives, and printer. This area is also used for expansion BIOS programs (such as those on the PC-XT hard disk adapter) and PCjr ROM cartridges.

IBM has also reserved 128K bytes of the total 1 megabyte for memory-mapped video displays. Though standard monochrome and color/graphics adapters use only a small part of this memory, IBM's Enhanced Graphics Adapter uses all of it.

The 640K left over is often called user memory. This is the area of random access

EXTENDED VS. EXPANDED MEMORY

memory (RAM) used by the disk operating system (DOS), resident programs, and any program and data currently in use. Now that extended memory and expanded memory are available, the 640K of user memory has come to be known as "conventional memory."

Just a few years ago, 640K was anything but conventional for personal computers. But it begins to look surprisingly small when you work with an integrated program to create a large spreadsheet or database. And it looks disgracefully inadequate when you bring up a multitasking system such as IBM's *Top View* or *Microsoft Windows*.

Since programs have been dealing with limited memory for so long, techniques have been developed to get around it. Some programs use overlay disk files so that only a small part of the total program need be in memory at any time. Many word processors use disk space to hold runoff from memory space. *Microsoft Windows* uses disk space for swapping programs in and out of memory.

Spreadsheet and database management programs cannot be so flexible, however. If spreadsheet programs had to perform disk accesses every time they recalculated a spreadsheet, they'd lose much of their popularity. And a database program can sort a set of records much faster when working entirely in memory than if part of the file is on disk.

Extended Memory

Enter the PC AT and the Intel 80286 microprocessor. The 80286 is very similar to and at the same time very different from the 8088. The similarity is that it can easily run most of the programs written for the 8088 with the same 1 megabyte of total memory and 640K bytes of conventional user memory. But one of the differences is that the 80286 can directly address 16 times as much memory as the 8088—a full 16 megabytes of memory (see Figure 2).

The dual personality of the 80286 derives from its ability to run in two different modes, called *real mode* and *protected mode*. When the 80286 is first powered up, it is in real mode and works very similarly to the 8088 in the PC and XT.

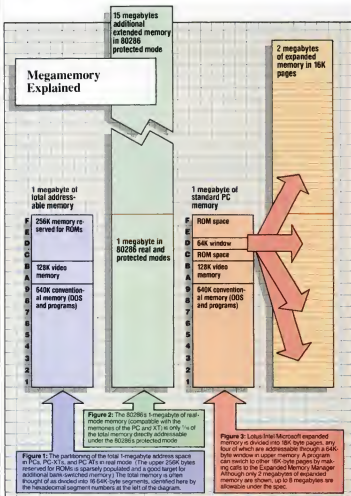
The 80286 can be put into protected mode with just a few assembly language

instructions. Although this mode can cause problems for many programs already written for the IBM PC, it potentially makes available an additional 15 megabytes of addressable memory. The 16-bit bus connectors on the PC AT system board furnish the additional address lines needed for the 16-megabyte memory addressing and the 16-bit transfers the 80286 uses.

The PC AT ROM BIOS will recognize extended memory only if 640K of conven-

tional memory has been installed. Since the PC AT system board can accommodate only 512K, most extended memory boards allow you to use part of the board's memory to "backfill" or bring conventional memory up to 640K.

The only DOS program that can take advantage of extended memory is VDISK, a virtual (or RAMdisk) program included with PC-DOS 3.0 and 3.1. This program sets aside an area of memory to mimic a



disk drive. But because the "disk" resides in internal memory, programs that ordinarily use disk space for overlays or data runoff will operate much faster with a RAMdisk than when using a real disk. RAMdisks have been popular for years; however, they usually reside in conventional memory and thus take memory away from other programs.

VDISK can create a RAMdisk in either conventional or extended memory. When VDISK is installed with the /E parameter, it uses only a small area of conventional memory for overhead and puts the simulated disk in extended memory. These extended memory disks can be huge, supplying megabytes of RAMdisk storage. Like RAMdisks installed in conventional memory, the disk contents are destroyed when the PC is turned off.

Extended Memory Drawbacks

Unfortunately, the PC AT's ROM BIOS support of 80286 extended memory is minimal. External programs can make only two function calls related to extended memory: The first to determine how much extended memory is installed, and the second to transfer data between conventional and extended memory. To accomplish the latter, the BIOS switches into protected mode, does the transfer, then switches back to real mode. During this time it disables the rest of the AT so that nothing else can interfere.

For full use of the AT's protected mode, you really need an operating system that supports the 80286. PC-DOS—at least in the current 3.1 version—is not it and is nowhere close to it. (Since XENIX, Microsoft's UNIX-like operating system, supports the 80286 in protected mode, it's not as if I'm talking about an impossible task.)

A worse problem is that neither the BIOS nor PC-DOS does any extended memory management, so applications cannot determine if other programs are already using part of extended memory. If a program assumes that all of extended memory is free, it may overwrite something needed elsewhere.

You can load more than one VDISK in extended memory because VDISK has its own way of determining what memory is still free. But this method is not document-

ed (except in the VDISK program listing), and it is not true memory management. Any program that relies on the same flaky memory management as VDISK does will surely have compatibility problems with future DOS versions.

In the current PC-DOS environment, the massive power and capabilities of the 80286 microprocessor are wasted. And VDISK, despite its usefulness, must be considered nothing more than a novelty item—a taste of the future.

Expanded Memory

The rather crude but effective "bank-

Existing software will not automatically use expanded memory, but support for the Expanded Memory Specification will be easy for software manufacturers to implement.

switching," or "paging," scheme that expanded memory uses breaks the 640K barrier in a way completely different from that of extended memory and can work in ordinary PCs and XT's, as well as AT's. Existing software will not automatically use expanded memory, but support will be relatively easy for software manufacturers to implement.

Expanded memory was developed by the combined forces of Lotus Development Corp. and Intel Corp., with Microsoft Corp. later joining the duo. It is known formally as the Lotus/Intel/Microsoft Expanded Memory Specification. The specification is a 70-page document that has been "released into the public domain and is not confidential or proprietary"; anyone can write software that uses expanded memory or develop compatible memory expansion boards.

Just the names of the three companies behind this scheme make expanded memory a de facto standard. Where is IBM in all this? It doesn't matter. When the creators of 1-2-3, the developers of the 8088 and 80286 microprocessors, and the au-

thors of the MS-DOS and PC-DOS operating systems decide upon a PC standard, there is not much that even IBM can do.

The Lotus/Intel/Microsoft Expanded Memory Specification is not the only bank-switching scheme around (see "Breaking the Memory Barrier," *PC Magazine*, Volume 4 Number 7), but it is almost surely the only one that will become a PC standard. Another specification announced by the combined forces of AST, Quadram, and Ashton-Tate is a superset of Lotus/Intel/Microsoft and uses additional bank-switching in the 640K of conventional memory. If Microsoft hadn't joined the Lotus and Intel camp, we might have seen an interesting market battle develop. But Microsoft's implicit promise of future PC-DOS support of the Lotus and Intel standard makes this the only one that counts.

As of this writing, Lotus's *Symphony*, Release 1.1, uses expanded memory, 1-2-3, Release 2, is expected shortly, and *Framework* and *SuperCalc* are both scheduled for expanded-memory updates. By the time you read this, you'll probably hear many more announcements from software manufacturers concerning future program releases that will use expanded memory.

Expanded Memory Rationale

The main purpose of expanded memory is to eliminate the "memory full" message that suddenly appears at the bottom of large 1-2-3 spreadsheets. This may seem like a drastic way to solve that problem, but adding a potential 8 megabytes to the memory that 1-2-3 normally uses will certainly eliminate most full-memory problems.

Although 1-2-3, Release 1A, permits a spreadsheet of 2,048 rows and 256 columns, you can never come close to filling it up because everything must reside in memory. Even if every cell held only 1 byte, the total memory needed would add up to 512K. Try putting a single character or number in the lower left-hand corner of an empty 1-2-3 worksheet and see the "memory full" problem for yourself.

While the idea of megabyte-sized spreadsheets is somewhat appalling to those of us schooled in the art of modular and structured programming, many corporate 1-2-3 users have no qualms at all about

it. Because 1-2-3 can link different spreadsheets only in a clumsy manner, it sometimes becomes necessary to put an entire financial projection in one spreadsheet.

If you've ever gotten a "memory full" message while working on a 1-2-3 spreadsheet or any other program, you know the temptation of expanded memory: If your spreadsheet is only half completed and you need results for the next board meeting, you're going to buy an expanded memory board tomorrow.

How Expanded Memory Works

In most systems, the topmost 256K-byte area of PC and XT memory that IBM has reserved for read-only memory is quite barren. Between the XT hard disk BIOS and the beginning of ROM BASIC, over 128K of unused memory space lies waiting for exploitation.

Unlike conventional memory, expanded memory requires that a program called the Expanded Memory Manager (EMM) be included as a device in a CONFIG.SYS file. During the booting process, the EMM searches for the first free 64K bytes of contiguous memory beginning in the top 256K of the PC's memory. When it finds a free area, it instructs the board to occupy that memory space. (Some expanded memory boards and EMM programs must be set to use a particular area in upper memory.)

From then on, up to 8 megabytes of expanded memory reside in that single 64K memory space somewhere above conventional memory. Fitting 8 megabytes into 64K is possible through a technique known as bank-switching. Obviously only 64K bytes can occupy the memory space at any one time. The 64K actually serves as a window for the 8 megabytes, which is treated as a collection of 16K-byte pages of memory. When instructed by a program to do so, the EMM can switch any 16K page of expanded memory out of the 64K window (without losing the contents) and switch another 16K into the memory space. Obviously, up to four 16K-byte pages may be active in the 64K window at any time (see Figure 3).

The bank-switching technique itself is old and relatively simple, but the advantage of Lotus/Intel/Microsoft specification is that the EMM provides true memory management and a uniform interface for

other programs using expanded memory. The EMM assigns each program that uses expanded memory a unique handle. Programs that use expanded memory request it from the EMM in page sizes of 16K bytes. The requested pages are allocated for that program and cannot be used by other programs. When the program no longer needs the expanded memory, it frees it up for other programs. In this way, expanded memory can be used by device drivers, resident programs, and multi-tasked programs (as well as by ordinary applications) with comparative safety.



PC Magazine poses the question: Is bank-switched memory a pig in a poke, or will it put you in fat city?

From the perspective of a programmer, expanded memory is very easy to use. Any program that already has enough logic to use more than 64K bytes of memory can easily be adapted by its programmers to use expanded memory just by making interrupt calls to the EMM. For this reason, you can expect to see expanded memory become standard in large PC programs.

Will expanded memory degrade speed? That depends on how it's used. Every time a program needs to switch a different 16K page into the 64K expanded window, it must make a call to the EMM. This takes time. If a program needs only 64K of expanded memory or if it processes expanded memory sequentially (as during a sort), then EMM calls will be kept to a minimum. But if a program must deal with a lot of expanded memory in a random man-

ner—as during a spreadsheet recalculation—then speed may suffer greatly. The more expanded memory used in such situations, the more likely that a needed memory location will be unavailable and require an EMM call.

Onward and Upward

Even with all the trappings of the EMM standard interface and memory management, expanded memory is really a junky makeshift fix for the PC's memory problems. If you don't believe me, listen to Microsoft chairman Bill Gates upon announcing that Microsoft would be joining Lotus and Intel in supporting the expanded memory specification: "It's garbage! It's a kludge! . . . But we're going to do it." (See "Memory Scheme Breaks 640K," *PC Magazine*, Volume 4 Number 10, page 33.) Lotus and Intel probably would not have phrased it quite this way, but deep in their hearts they would have agreed.

On the other hand, the expanded memory scheme is so simple, so easy to use, and so clearly documented that for the short term, at least, it's the best solution. More than 4 million PCs and XTs now sit on desks in offices and homes. More than 1 million copies of Lotus's 1-2-3 have been sold. And all over corporate America, power users of spreadsheet and database products are pleading for more memory. While the real long-term answer is obviously the extended memory of the PC AT and 80286 microprocessor, how many users will be willing to replace their PCs and XTs with ATs, buy extended memory, wait for PC-DOS to control protected mode, and then replace all their software with protected-mode versions? Expanded memory, an 8087 math coprocessor chip, and software to support both will breathe new life into the PC and XT.

Although I've been speaking of kilobytes and megabytes, the 80286 brings another metric prefix into view: the gigabyte, or 1 billion bytes. While the 80286 can directly address 16 megabytes of actual memory, it can really handle 1 gigabyte of "virtual memory," which may or may not be located in actual addressable memory space but which the operating system could load into actual memory.

But that is the future. Expanded memory is here right now.—Charles Petzold

Intel Above Board/AT

The Above Board/AT from Intel Corp. may be the perfect solution for the PC AT owner who can't decide whether to go the extended or expanded memory route: It supports both—not surprising, since Intel has its fingers in both big-memory design pies. It created the 80286 chip that supports extended memory and shared its development of the expanded memory specification with Lotus and Microsoft.

The basic board can hold up to 2 megabytes using 256K-bit chips; a "piggy-back" board (Intel's terminology) doubles that. Two sets of DIP switches set up the Above Board/AT for combinations of conventional, extended, or expanded memory. To use extended memory, you must bring the conventional memory in your AT up to a full 640K bytes. However, extended memory is available on this board only in unwieldy 512K-byte chunks, so you have to use up an entire 512K bytes of the new memory just to fill the 128K-byte gap between an enhanced AT's 512K bytes and the necessary 640K. However—and this is true for all the boards—you don't need to fill in conventional memory to use expanded memory.

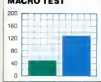
Software that is bundled with the Above Board/AT includes the Expanded Memory Manager (EMM), RAMdisk software, a print spooler, and an installation program. I found the installation program to be a great nuisance and somewhat deceptive. Although the documentation states very clearly that expanded memory is available only to those programs that can support it, the installation menu comes up on the screen with the names of ten popular

PC BENCHMARK

Intel Above Board/AT Class: AT

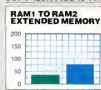
All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tall Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate 128K of expanded memory; so the test was run on those boards also.

■ Intel Above Board/AT
■ Average

RAM1 TO RAM2 EXPANDED MEMORY



The RAMdisk test of Lotus Intel Microsoft expanded memory is the same as the test for extended memory except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

software packages—none of which support expanded memory. After you select one, it alters your CONFIG.SYS file to include the EMM and one or two RAMdisks appropriate for the selected program, and then it alters your AUTOEXEC.BAT file to include a print buffer.

If your CONFIG.SYS file already contains drivers for an existing hard disk on your system, you'll find that the drive letter for that hard disk will change because the installation program puts the EMM and RAMdisks on the top of the CONFIG.SYS file. So you'll probably want to go in there and edit the CONFIG.SYS file to change the order of the drive assignments. But nowhere does Intel document the actual parameters for the .SYS files. Of course, you can see what the installation program sets up and just copy it, but some of us like to know a little more about these things.

A simple chart in the Above Board/AT's manual would have been quite sufficient for setting up RAMdisks and print spoolers. While I'm sympathetic to the plight of PC beginners grappling with the complexities of PC-DOS, I can't believe that people who are ready to add 2 megabytes of memory to their machines are incapable of editing a CONFIG.SYS or AUTOEXEC.BAT file.

The Above Board/AT is a fine product marred by a severe underestimation of the intelligence of its buyers.

—Charles Petzold

IDEA Supermax

The IDEA Supermax is a multifunction board containing one parallel and one serial port in addition to sockets for conventional or extended memory. The base board holds up to 1.5 megabytes using 256K-bit chips; a daughterboard adds 2.5 megabytes to that. A second serial port option is also available.

Nowhere in the IDEA Supermax manual is there any mention of the term "extended memory" or explanation of what it means. The manual seems to imply that all the memory on the Supermax board is just a normal addition to the memory already installed on your PC AT system board. It seems simple when discussed in the manual, but the difference between conventional memory and extended memory is not a simple concept and this method of handling—or avoiding—the subject just adds to the confusion.

The board can use 128K bytes or 384K

PC FACT FILE

Above Board/AT

Intel Corp.
Mailstop TOC-03
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124
(800) 538-3373 (outside Oregon)
(503) 629-7354 (Oregon)

List Price: basic board: 128K RAM using 64K-bit chips, \$595; 512K RAM using 256K-bit chips, \$795; 2 megabytes using 256K-bit chips, \$1,495. Piggy-back: 128K RAM using 64K-bit chips, \$295; 512K RAM using 256K-bit chips, \$495; 2 megabytes RAM using 256K-bit chips, \$1,195

Requires: PC AT or compatible.

Type: extended and expanded memory

CIRCLE 664 ON READER SERVICE CARD

PC FACT FILE

IDEA Supermax

IDEA Associates Inc.
35 Dunham Rd.
Billerica, MA 01821
(617) 663-6878

List Price: 128K RAM using 64K-bit chips, \$595; 512K RAM using 256K-bit chips, \$895; 1.536K RAM using 256K-bit chips, \$1,095; 4.096K RAM using 256K-bit chips and daughterboard, \$3,795

Requires: PC AT or compatible.

Type: extended memory

CIRCLE 663 ON READER SERVICE CARD

EXTENDED VS. EXPANDED MEMORY

bytes to backfill, bringing conventional memory up to 640K bytes. However, adding more boards beyond the first may be a problem because the board has only three switches to specify a starting address for the board memory. While a representative at IDEAssociates Inc. assured me that the eight possible switch settings represent 99 percent of the probable real-life configurations, I was able to hypothesize a few reasonable configurations that the board could not handle.

If you want to add a second Supermax board, the switch problem makes your best choice a configuration with 4 megabytes on the first board with either 128K bytes of backfilled conventional memory or no backfill at all. You will, however, have no

problems if this is the first extended memory board in your system.

An extensive collection of software utilities accompanies the board. Along with the standard RAMdisk and print spooler, a utilities menu allows you to select among a desk calculator, a file concatenator, a copy program that works on hidden files, a text-file word counter, and a UNIX-like *grep* (pattern searcher) program. Also included is a memory diagnostics program that can be very helpful in tracking down bad memory chips.

Since not all of this admittedly useful software is related to extended memory, its inclusion with the board is somewhat baffling. But IDE Supermax is a good board, all the same. —Charles Petzold

AST RAMvantage!

From a company long involved in making quality expansion boards for the IBM PC comes an AT extended memory board that doesn't try to be anything else.

In the maximum configuration, the RAMvantage! board from AST Research Inc. is filled almost solidly with 256K-bit chips for a total of 3 megabytes. No other board evaluated by *PC Magazine* for this survey succeeded in stuffing that much memory onto a single board; others had to resort to a separate daughterboard.

The memory on the board can be split between extended and conventional memory to fill in the gap between installed conventional memory and 640K bytes. Unlike some other boards, however, the RAMvantage! does not sacrifice any memory when making this split. The DIP switches that specify the starting address allow 128K-byte increments up to 6 megabytes; hence two more boards can be easily added, bringing total extended memory up 9 megabytes (less any used for backfilling).

A wealth of available starting addresses makes the RAMvantage! a flexible board that can handle almost any combination of extended memory boards that may have been previously installed in your AT.

The manual is thin but tells you everything you need to know about setting the DIP switches and supplying the right answers to the prompts in the AT's Setup program. The manual contains some exceptionally clear diagrams and tables for this purpose. Although it was not available in time for this review, the package will include *SuperPak Utility* software with an extended memory RAMdisk and print spooler.

AST's RAMvantage! is a simple, no-

IDEA Supermax Class: AT

All times are given in seconds

SYMPHONY MACRO TEST



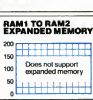
This Symphony macro test, developed by Tall Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

IDEA Supermax
Average



The RAMdisk test of Lotus/Intel/ Microsoft expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

AST RAMvantage! Class: AT

All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tall Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

AST RAMvantage!
Average



The RAMdisk test of Lotus/Intel/ Microsoft expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

PC FACT FILE

RAMvantage!
AST Research Inc.
2121 Alton Ave.
Irvine, CA 92714
(714) 863-1333

List Price: 128K RAM using 64K-bit chips, \$495;
512K RAM using 256K-bit chips, \$695; 1 megabyte
RAM using 256K-bit chips, 2 megabytes RAM using
256K-bit chips, \$1,895; 3 megabytes RAM using
256K-bit chips, \$2,695

Requires: PC AT or compatible.
Type: extended memory

CIRCLE 68 ON READER SERVICE CARD

fuss extended memory board with a clarity of design and purpose that I find very appealing. —Charles Petzold

Basic Time AT 4x4 Plus

Loaded up with all the options you could ever desire, the AT 4x4 Plus from Basic Time is a formidable sight on paper and "in person." The basic board holds up to 2 megabytes of extended memory and includes a parallel and serial port. The AT 4x4 RamPak is a daughterboard, available at extra cost, that adds another 2 megabytes. A second serial port is available as an option; so is a game port.

If that's not enough, you can get the 4x4 Dual Serial Pak option with two more serial ports that work under a shared interrupt scheme supported by XENIX and MULTILINK ADVANCED. All these options fit neatly on top of the main board and result in an impressive hunk of hardware.

You can use the first board's memory for backfilling to bring conventional memory up to a full 640K bytes, and then you can add a second board filled up with another 4 megabytes. The Basic Time AT 4x4 Plus manual contains good clear charts showing the DIP switch settings and PC AT setup program information for all the various configurations. Unfortunately, no software is included in the memory board package.

The AT 4x4 Plus board is particularly attractive if you want megabytes without spending megabucks. I had to call Basic Time back for confirmation on prices so low I knew they just had to be wrong. The prices aren't wrong, but they sure are astonishing. —Charles Petzold

PC FACT FILE

AT 4x4 Plus

Basic Time

3350 Scott Blvd.

Bldg. 52

San Jose, CA 95054

(408) 727-0877

List Price: basic board, 128K RAM using 64K-bit chips, \$445; 512K RAM using 256K-bit chips, \$495; 1 megabyte RAM using 256K-bit chips, \$695; 2 megabyte RAM using 256K-bit chips, \$995. **AT 4x4 RamPak** of 2 megabytes using 256K-bit chips, \$695. **Requires:** PC AT or compatible.

Type: extended memory

CIRCLE 676 ON READER SERVICE CARD

Quadram Liberty-PC

The Liberty-PC expanded memory board from Quadram can hold a total of 2 megabytes. You can install four of them in your PC or PC-XT for the maximum 8 megabytes under the Lotus/Intel/Microsoft standard.

The *QuadMaster III* software disk that is included with the board has an expanded-memory-manager .SYS file, plus RAMdisks and print spoolers that you can install in either conventional or expanded memory.

The package contains two manuals. The first concerns the board itself and DIP switch settings. The DIP switches specify the size of the expanded memory you are installing, the expanded memory window

(either D000h or E000h), and one of a number of possible I/O addresses at which the board can be accessed. I found this manual confusing but fortunately didn't need to use it: The board's switches are

PC FACT FILE

Liberty-PC

Quadram

1 Quad Way

Norcross, GA 30093-2919

(404) 923-6666

List Price: 64K RAM using 64K-bit chips, \$395; 256K RAM using 256K-bit chips, \$595; 1 megabyte RAM using 256K-bit chips, \$995; 2 megabyte RAM using 256K-bit chips, \$1,395.

Requires: PC, XT, or compatible.

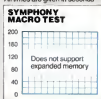
Type: expanded memory

CIRCLE 680 ON READER SERVICE CARD

BENCHMARK

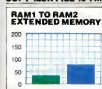
Basic Time AT 4x4 Plus Class: AT

All times are given in seconds



This Symphony macro test, developed by Tilt Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

Average

Basic Time AT 4x4 Plus

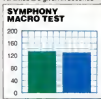
Average

Basic Time AT 4x4 Plus

Average

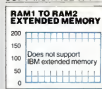
Quadram Liberty-PC Class: PC

All times are given in seconds



This Symphony macro test, developed by Tilt Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

Quadram Liberty-PC

Average

factory set to the most reasonable configuration, and that one worked fine.

The second manual discusses software on the *QuadMaster III* diskette. The software does not include an installation program, but the manual walks you through the creation of the CONFIG.SYS file necessary for the expanded memory manager and any RAMdisks and other utilities that you may want. Parameters for the expanded memory manager .SYS file must match certain settings on the two DIP switches on the board, but again, examples are shown for the most reasonable configuration.

If you have any memory or I/O conflicts with the board, you'll have to dig further into the documentation for something that will work on your system. Since the board's bank-switching circuitry can be accessed at many different I/O addresses, that shouldn't cause a problem, but the board will be unusable if you have any other hardware addressed in both the D000h and E000h segments. One of these two 64K-byte segments must be entirely free.

For a normal PC-XT, Quadram's Liberty-PC board is very easy to install and get running. —Charles Petzold

Maynard Accent

A single Maynard Accent card adds up to 2 megabytes of expanded memory to your system in banks of 64K-bit or 256K-bit chips. You can select the amount of memory you want used to backfill your conventional RAM, or you can allow the software to automatically fill conventional RAM to the 640K-byte limit taking into consideration the entire amount of RAM you already have installed on the motherboard and any other memory cards together. With this strategy you can use up to four Accent cards in a single system (assuming you have four long slots to spare), yielding a maximum



Accent

Maynard Electronics
460 E. Senoran Blvd.
Casselberry, FL 32707
(305) 331-6402

List Price: no RAM, \$285; 512K RAM, \$505; 2 megabytes RAM, \$1,165

Requires: PC, XT, or compatible.

Type: expanded memory

CIRCLE 618 ON READER SERVICE CARD

of 8 megabytes.

All eight factory DIP switch settings and the jumper connection on the board I reviewed were set correctly for an IBM PC-XT with 640K bytes (standard equipment in the PC Magazine Labs), which made the installation of the hardware a four-step snap: First, remove the system unit cover; second, plug the card into any open slot; third, replace the cover; and fourth, power up.

I fully expected to pay for the convenience of this simple procedure during the installation of the software, but that turned out to be an equally easy process.

The Quick-Decision Guide to Big Memory

Need megabytes in a hurry? Read on to see if you require expanded or extended memory.

You use a PC, PC-XT, or compatible. You can't install extended memory because that's for PC ATs. You can get expanded memory and install a RAMdisk or print spooler. New versions of 1-2-3, Symphony, Framework, and SuperCalc will take advantage of expanded memory if present.

You use a PC AT and want some more memory for your spreadsheet and database management programs. Expanded memory again is the answer, because PC-DOS applications programs can't yet take advantage of extended memory and won't be able to until PC-DOS undergoes a major overhaul.

You use a PC AT and just need some massive RAMdisks. You will probably get much more RAM for your dollar if you go for an extended memory board. The extended memory boards can pack in more chips because they don't need the overhead circuitry that is required for expanded memory. The PC-DOS VDISK program can use the extended memory; no other PC-DOS program can take advantage of it. If you already use a RAMdisk in conventional memory, moving it to extended memory will let other programs have more space.

You use a PC AT and you'd like some big RAMdisks, but you don't want to leave left out when more pro-

grams start supporting expanded memory. Get expanded memory. It too can run RAMdisks.

You use a PC AT and mostly run the XENIX operating system on it. In this case you want extended memory, because XENIX (unlike PC-DOS) supports the 80286 microprocessor in protected mode. XENIX will not recognize expanded memory.

You can easily run all your programs in the conventional memory already installed. Don't feel inadequate just because you don't create megabyte-sized spreadsheets. Be proud of your contribution to silicon conservation.

Once you've made your choice, several other factors require your consideration: If you have a PC AT and want an expanded memory board, make sure it's on an AT board with the 16-bit bus. Most boards for the PC AT are extended memory boards.

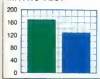
Also, many of the extended and expanded memory boards can be populated with either 64K-bit or 256K-bit chips. Be serious about this. If you want a big hunk of additional memory, forget about 64K-bit chips. You'll eventually be pulling them out and replacing them with 256K-bit chips. Removing chips is worse than installing them, and neither job is a picnic. —Charles Petzold

PC BENCHMARK

Maynard Accent Class: PC

All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tai Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

*Simulates IBM extended memory

COPY 128K FILE 10 TIMES

RAM1 TO RAM2 EXTENDED MEMORY



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory so the test was run on those boards also.

■ Maynard Accent

■ Average

RAM1 TO RAM2 EXPANDED MEMORY

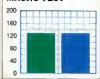


The RAMdisk test of Lotus/Intel/ Microsoft expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

Tecmar 640 Plus Class: PC

All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tai Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES

RAM1 TO RAM2 EXTENDED MEMORY



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory so the test was run on those boards also.

■ Tecmar 640 Plus

■ Average

RAM1 TO RAM2 EXPANDED MEMORY



The RAMdisk test of Lotus/Intel/ Microsoft expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

Tecmar 640 Plus

Tecmar's new 640 Plus meets the Lotus/Intel/Microsoft specifications for an expanded memory device, allowing your PC or compatible to access memory above the 640K-byte range. The 640 Plus comes in three configurations that add from 256K bytes to 2,048K bytes of expanded RAM to your system. If you buy a partially populated model, you can add chips one bank at a time until the board is full. (You can use either 64K-bit or 256K-bit chips, but not both on the same board.) A maximum of four 640 Plus boards can be used in a system, yielding up to 8 megabytes of expanded memory.

The 640 Plus has only four DIP switches, and they must be set before the board is installed because they are inconveniently located near its base. All the DIP switches were correctly set to "on" at the factory. The switches set the I/O addresses for the 640 Plus's page registers and identify the different 640 Plus boards if more than one is installed.

This board has no extra ports to configure; installation is a simple matter of plugging the board into any open long slot. For those who have never opened their system units before, an entire 38-page booklet is devoted to that subject and includes illustrations for opening the system unit of a dozen popular computers. The installation and operating manual (only a dozen pages longer) is less generous; it's equally clear and to the point, but brief.

The disk that comes with the 640 Plus contains four programs, one of which is a sample CONFIG.SYS file that will get the board up and running right away. Later, you can modify the file to suit the rest of your system. A diagnostics program tests the chips on the board and pre-

IBM's VDISK, the RAMdisk program included with DOS 3.0 and later, normally can be installed only in conventional memory or AT extended memory. But the Accent card sneaks around this problem by using expanded memory to emulate AT extended memory. You can therefore install VDISK outside of PC or XT conventional memory with Accent. This solution to extended memory emulation seems like a temporary one, but few other cards offer any means at all of using VDISK on a PC.

Upon rebooting after installing the card, you receive a message that the Maynard Accent expanded memory driver is installed, plus a status report on the total number of Accent cards present

and the amount of RAM installed, available, and reserved by the system. A diagnostics routine is available to test the card or cards, check their memory, and perform a random read and write test on that memory.

The manual is brief, aided greatly by the screen menus and on-line help during installation. It is well written and contains a very good section on both potential error messages and Maynard's suggested remedies. An index, however, would have been helpful.

Accent plans to support Maynard's mouse, but as of the publication of this manual, the mouse software driver and mouse test had not been completed.

—Phil Wiswell

PC FAMILIE

640 Plus

Tecmar Inc.

6225 Cochran Rd.

Solon, OH 44139

(216) 349-0600

List Price: \$12K RAM, \$995; 1,024K RAM, \$995;

2,048K RAM, \$1,395

Requires: PC, XT, or compatible.

Type: expanded memory

CIRCLE 679 ON READER SERVICE CARD

EXTENDED VS. EXPANDED MEMORY

sents a clever screen display: It shows a picture of the board on the screen, and you can watch as it marks the individual chips as OK or defective. With a fully populated 640 Plus, this process can take 5 minutes, but replacing a defective chip will be simple because the screen shows you exactly where it is.

Tecmar also supplies a RAMdisk program that lets you map up to the 8,192K-byte maximum expanded memory (four fully populated boards) as one giant virtual drive, or segment it into several drives. During a warm boot, no information is disturbed on the RAMdisks that the 640K Plus sets up. —Phil Wiswell

Mega-Omega Companion Card

The Companion Card from Mega-Omega Systems combines the features of both an expanded memory card and a traditional multifunction board. A single

Companion Card will round out any system to full DOS capacity (640K bytes of RAM), devote the rest of its 2,048K bytes (in 256-kilobit chips) to expanded

The Companion Card combines the features of an expanded memory board and a traditional multifunction board. A single card with 2,048K bytes tosses in ports and a real-time clock.

memory, toss in parallel, serial, and games ports and a real-time clock, and keep its memory alive despite power outages with an optional back-up battery. If you need even more megabytes, you can

slide three more memory-only Companion Cards into your system to stretch its capacity to 8 megabytes.

Getting those features onto one card would seem to require more magic than engineering expertise. Mega-Omega relies instead on adding piggyback daughterboards atop a single full-length card. A childless Companion Card has space for but four banks of nine 256K-bit memory chips. One daughterboard adds four more banks, and another daughterboard

PC FACT FILE

The Companion Card
Mega-Omega Systems Inc.
5217 Ross Ave., #710 LB 122
Dallas, TX 75206
(214) 828-0960

List Price: no RAM, \$177; 1 megabyte RAM, \$285; 2 megabytes RAM, \$480

Requires: PC, XT, or compatible.

Type: expanded memory

CIRCLE 682 ON READER SERVICE CARD

Features of Extended and Expanded Memory Boards

Board and price	Max. memory on board (in megabytes)	Max. memory on additional boards (in megabytes)	Class	Expanded memory	Extended memory	Backtilling	Special hardware features
AST RAMvantage! \$495 - \$2,695	3	6 (on 2 boards)	AT	no	yes	yes	none
Basic Time AT 4 × 4 Plus \$445 - \$995	4	4 (on 1 board)	AT	no	yes	yes	parallel and serial printer ports
IDEA Supermax \$595 - \$3,795	4	4 (on 1 board)	AT	no	yes	yes	serial port, parallel port
Intel Above Board AT \$595 - \$1,495	4	2.5 (on 1 board)	AT	yes	yes	yes	none
AST RAMpage! \$495	2	6 (on 3 boards)	PC	yes	emulated	yes	none
Emulex's Persyst Stretch Board \$295 - \$1,895	2	6 (on 3 boards)	PC	yes	no	no	none
Intel Above Board PC \$395 - \$1,395	2	6 (on 3 boards)	PC	yes	no	yes	none
Maynard Accent \$285 - \$1,165	2	6 (on 3 boards)	PC	yes	emulated	yes	supports Maynard mouse
Mega-Omega Companion Card \$177 - \$480	2	6 (on 3 boards)	PC	yes	no	yes	parallel, serial, game ports; real-time clock; auxiliary power supply with battery backup
Quadram Liberty-PC \$395 - \$1,395	2	6 (on 3 boards)	PC	yes	no	yes	none
Tall Tree JRAM-3 \$399 - \$699	2	14 (on 7 boards)	PC	yes	no	no	optional serial, parallel, and clock module
Tecmar 640 Plus \$595 - \$1,395	2	6 (on 3 boards)	PC	yes	no	no	none

PC BENCHMARK

Mega-Omega Companion Card Class: PC

All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tall Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in searching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES

RAM1 TO RAM2 EXTENDED MEMORY



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can simulate AT extended memory, so the test was run on those boards also.

■ Mega-Omega Companion Card
■ Average

RAM1 TO RAM2 EXTENDED MEMORY



The RAMdisk test of Lotus Inter Microsoft expanded memory is the same as the test for extended memory except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

adds the ports and clock.

Switches on The Companion Card allow a portion of its memory endowment to flesh out the memory of any PC that has a fully loaded system board and any other memory card from 64K bytes to 576K bytes of RAM. If you use the board to backfill conventional memory, you'll find the Mega-Omega conventional memory slower than the memory already installed in your PC. When PC Magazine Labs ran Peter Norton's SYSINFO program in this backfilled memory, it calculated a performance index of 0.7. No other expanded memory board that could backfill conventional memory had this problem.

The battery option is a thoughtful extra. The built-in charger will keep the memory in The Companion Card intact even when its host PC or XT is turned off. The battery itself keeps the memory vivid even during power failures up to 2 hours long. The only problem is the size of the back-up unit: It's about as big as a standby power system designed to keep an entire computer running.

Even The Companion Card software has features beyond what you expect from other expanded memory boards. Mega-Omega's disk emulator program allows you to build up to eight virtual disks in expanded memory. An option to the expanded memory driver permits you to omit the 2-megabyte memory check at turn-on time.

A simplified system configuration

program will handle getting started for you, if you're afraid of putting together your own CONFIG.SYS file. If you decide to do the installation work yourself, you'll find the skinny instruction pamphlet to be spare but sufficient. It includes everything you need to know.

Workmanship rates only as okay; I have specific reservations about the tight-packed piggyback design. Although the double-decked memory chips run coolly enough, heat does build up under the port daughterboard where logic chips are stacked. This temperature could be the reason The Companion Card gave a Parity Check 2 error in the middle of testing. Nevertheless, Mega-Omega gives you a generous 5-year limited warranty. —Winn L. Rosch

Emulex's Persyst Stretch Board

It may have a gimmicky name for a board that stretches conventional memory beyond the 640K-byte barrier of addressable RAM, but there is nothing gimmicky about the Persyst Stretch Board. It is designed according to the Lotus/Intel/Microsoft spec, supports the latest versions of 1-2-3, Symphony, and Framework, and comes with a useful range of utilities.

The Stretch Board can supply up to 2 megabytes of socketed RAM in eight banks of 256K-bit chips that you can add yourself (the board does not accept 64K-bit chips). You can use four fully popu-

lated boards in one system for the maximum of 8 megabytes of expanded memory. The Stretch Board lacks one feature common to most other boards: It does not currently let you backfill your supply of conventional RAM if you have less than the required 640K bytes.

The installation and operation manual is a model for the industry—it is not only well written and well organized, but beautifully typeset and contains photographs of the board showing how to install it. It couldn't be much clearer. A separate manual for the software is equally impressive, and together the manuals provide all the information you'll need to get the most out of the board.

Installation took longer than with some of the other boards I tested, not because it requires lengthy preparation—the Stretch Board has just four DIP switches to set the memory-page register addresses—but because there was more to read. A good deal of information is included on how to program the board's expanded memory manager directly. If you're using a single Stretch Board and don't plan to use the expanded memory in the programming of your own applications, you can insert the board without changing the factory settings.

Along with the expanded memory management software are three very useful programs: a print spooler, a RAM-disk, and a clock/calendar program to interface between the real-time clock chip and DOS. Both the print spooler and the RAMdisk run in expanded memory, leaving your normal RAM available for other applications. The spooler, called *Wait-Less Printing*, requires only 3K bytes plus whatever print buffer space you set aside, up to the maximum of expanded memory. Documents can be transferred from this memory to the

PC FUTURE

Emulex's Persyst Stretch Board

Emulex Corp.
Persyst Division
3545 Harbor Blvd.
Costa Mesa, CA 92626
List Price: no RAM, \$295; 256K RAM, \$495; 1 megabyte RAM, \$1,095; 2 megabytes RAM, \$1,895
Requires: PC, XT, or compatible.
Type: expanded memory
Circle 677 on Reader Service Card

EXTENDED VS. EXPANDED MEMORY

printer while your PC is busy with other applications.

The RAMdisk, called *Insta-Drive*, supports multiple virtual drives whose characteristics you determine. You may specify drive size from 1K byte to the maximum available memory, sector size, number of directory entries, and options for installing the drives in conventional or expanded memory. Examples of various CONFIG.SYS file commands are given for all user-specified options of the Stretch Board.—Phil Wiswell

Tall Tree JRAM-3

The price of Tall Tree's new expanded-memory board is hard to believe. At \$700 for 2 megabytes of RAM, you must be sacrificing something at that price, right? Wrong. The JRAM-3 offers all the features of boards costing twice as much, right down to the gold-plated connectors. So where's the catch—do you have to solder your own circuit board? Wrong again. The board is completely assembled and tested. Well, it must be incompatible with the Lotus/Intel/Microsoft standards. Nope, Lotus has certified the board as 100 percent compatible.

So what's wrong with the JRAM-3? Nothing! This board yields an excellent price/performance ratio for above-board memory expansion.

The JRAM-3 has a capacity of 2 megabytes using 256K-bit chips or 512K bytes using 64K-bit chips, and the two kinds of chips can be mixed on the same board. Up to eight JRAM-3 boards can be used in the same system for a whopping 16 megabytes of additional RAM. Of course, expanded memory software currently can address only 8 megabytes, but Tall Tree's RAMdisk and print spooler, included at no charge, can use the full 16 megabytes.

PC FACT FILE

JRAM-3

Tall Tree Systems Inc.
120 San Antonio Rd.
Palo Alto, CA 94303
(415) 964-1980

List Price: 256K RAM, \$399; 2 megabytes RAM, \$699

Requires: PC, XT, or compatible; 256K RAM.

Type: expanded memory

CIRCLE 681 ON READER SERVICE CARD

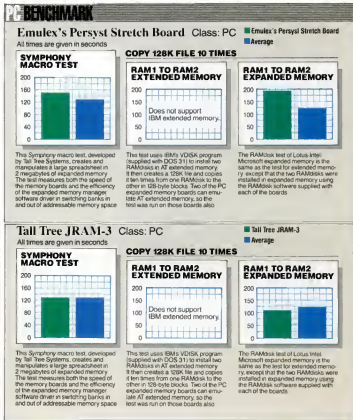
To add a JRAM-3 board, you don't need to reconfigure your motherboard's DIP switches at all; and if you're adding just a single board, you don't have to change the six DIP switches on the JRAM-3 either—just plug it into any open slot and power up. For ease of later reconfiguration, DIP switches are located on the top of the board.

The allocation of JRAM-3 memory to RAMdisks and conventional and expanded RAM in 64K-byte blocks is controlled by software. You can change configurations either by changing the CONFIG.SYS file or by rebooting with a disk containing a different CONFIG.SYS file.

JETDRIVE, Tall Tree's RAMdisk, al-

lows you to create up to four virtual drives in increments of 64K bytes up to the maximum 16 megabytes. The software tests and reports the status of the RAMdisks on boot-up; it also traps divide-overflow and parity errors to prevent your system from crashing. You get the JET high-speed file-transfer utility too, which moves programs or data to and from the RAMdisks at least twice as fast as the DOS COPY command and perhaps as much as 15 times faster, according to the company.

Tall Tree has included its popular JSPPOOL print spooler on the disk. You can select among multiple parallel and serial printers with a single command. JSPPOOL requires only 4K bytes plus the



buffers, and documented source code is included for the device driver.

Several piggyback modules are available for the JRAM-3, such as a pair of printer ports (in any combination of serial and parallel) for \$140, a clock/calendar option for \$80, and the ports plus the clock for \$200.—Phil Wiswell

Intel Above Board/PC

The Above Board/PC from Intel Corp. has space for eight banks of nine memory chips each. You can use either 64K-bit or 256K-bit RAM chips, as long as all the chips on a single Above Board/PC are of the same size. Thus an Above Board/PC memory capacity can be either 512K bytes or 2,048K bytes.

Up to four Above Board/PCs can be added to a single PC or XT, yielding a maximum of 8,192K bytes of additional memory. Of course, the host computer must have enough vacant slots and a sufficient supply of electricity. Each board



Above Board/PC
Intel Corp.
Mailstop T0C-03
5200 NE Elam Young Pkwy.
Hillsboro, OR 97124
(800) 538-3373 (outside Oregon)
(503) 629-7354 (Oregon)
List Price: 64K RAM, \$395; 2 megabytes RAM, \$1,395
Requires: PC, XT, or compatible.

Type: expanded memory
CIRCLE 685 ON READER SERVICE CARD

draws about 1.3 amps from the 5-volt bus of the host computer, and the standard IBM PC has a total of only 7 amps available for all internal circuitry.

Up to a 384K-byte portion of the Above Board/PC memory can be assigned to backfill the host computer's 640K-byte maximum address limit. DIP switches select the number of 64K-byte blocks assigned to DOS memory. The only requirement is that the host PC have a full 256K-byte endowment before any Above Board/PC memory is used.

The Above Board/PC is accompanied by four programs. One of them is the expanded memory manager, which allows the host computer to access memory beyond the DOS limit. Intel also supplies a floppy disk emulator program that operates in the expanded memory area and can be used to configure up to two RAM-disks of nearly any size.

The third program is a print spooler. More than just holding characters, this program supplies a two-line pop-up, bottom-of-the-screen control menu to help manage the print queue. You can temporarily halt printing jobs, cancel them, insert screen replicas and form feeds, or reset the printer.

The final program is called SETUPAB, and it helps in setting up the host system's CONFIG.SYS and AUTOEXEC.BAT files for proper operation of the Above Board/PC. Intel obviously takes the view that this product is for someone just out of business school who may have

never seen a computer before. Run the SETUPAB program, and you are painlessly lead through a menu-driven installation process.

Ordinarily, installation is not a problem. However, if you want to do something extraordinary, such as custom-install the Above Board/PC and its software features for your particular computer, you're on your own. You're given no guidance as to what options to use with the various Intel programs. The menu-driven program is supposed to take care of all of that, without telling you what is for what or why. Unfortunately, the otherwise exemplary instruction manual is mute about the program options that SETUPAB assigns.

Overall, the workmanship of the Above Board/PC is above reproach, cleanly laid out on a single printed-circuit board. Intel seems cocksure about the quality of the product, covering it with a 5-year limited warranty and making the underlying board an unusual blue color. Then again, the color might be an intentional hint at Intel's IBM connection.—Winn L. Rosch

AST RAmPage!

AST Research's RAmPage! board is remarkable in that it can give any PC or XT both expanded memory and the extended memory capabilities of the AT. Also, it has a special dual-page mode that you can use with its expanded memory.

The RAmPage! accepts only 256K-bit RAM chips in up to eight nine-chip banks. A single board can thus add 2,048K bytes of memory to its host computer system, and up to four boards can be used together to give you over 8 megabytes. The RAmPage! can allocate its on-board memory to either conventional (or system) memory, expanded memory, or extended memory in almost any com-



RAmPage!
AST Research Inc.
2121 Alton Ave.
Irvine, CA 92714
(714) 863-1333
List Price: 256K RAM, \$495
Requires: PC, XT, or compatible.
Type: expanded and extended memory
CIRCLE 686 ON READER SERVICE CARD

PC BENCHMARK

Intel Above Board/PC Class: PC

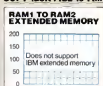
All times are given in seconds

SYMPHONY MACRO TEST



The Symphony macro test, developed by T&E Test Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

■ Intel Above Board/PC
■ Average

RAM1 TO RAM2 EXPANDED MEMORY



The RAMdisk test of Lotus Intel MicroSoft's expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

EXTENDED VS. EXPANDED MEMORY

bination on XT's or PC's with either 64K-byte or 256K-byte system boards.

The extended memory mode of the RAMpage! is a neat engineering trick that reroutes BIOS calls meant for AT-style extended memory to the appropriate places on the board. As a result, DOS's VDISK will run in the extended memory area using its /E option. Software designed to run in this memory area on the AT supposedly will work here. You need only to find the software.

Also, all the functions of this extended memory emulation function could not be tested because our benchmark software refused to exploit any extended memory when an 80286 microprocessor was not present.

If you fear the dreaded Parity Check 2 error popping up suddenly while you have 2 megabytes of memory filled with your favorite data, AST will let you avoid the resultant system lockup completely (as well as the protection it affords). Removing a single jumper will

default all on-board parity checking.

AST supplies both a floppy-disk-emulator program, which will create a number of RAMdisks in expanded memory, and a print spooler, which will also run in

semble the genuine article as closely as possible. You can thus specify eight- or nine-sector, single- or double-sided disks up to 360K bytes of total capacity, but you cannot use the entire expanded

memory area for RAMdisks.

The software AST supplies also includes several prototypical CONFIG.SYS files prefabricated for common system configurations to ease the installation process. They proved helpful during testing because the instruction manual, although reasonably clear, seemed over-brief and insufficiently explained too many facets of system setup and operation.

AST's added

dual-page mode for expanded memory would deserve mention if AST had given it some in the instruction manual. All that AST reveals about this mode is that it requires special software to take advantage of its usefulness. There's not a hint to be found about what that software is or whether any exists.

The workmanship of the RAMpage! is good, marred only by several "engineering revisions"—little add-on jumper wires—on the foil side of the circuit board. The limited warranty lasts 2 years.—Winn L. Rosch



Charles Petzold testing memory boards in the PC Magazine Labs.

expanded memory. The disk emulator requires that the DIP switches in the host be set for the number of genuine floppy disk drives plus the number of emulated disks. Hence, a maximum of four floppies, real or emulated, are possible.

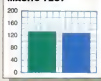
The AST disk emulator assumes you want your imaginary disk drives to re-

PC BENCHMARK

AST RAMpage! Class: PC

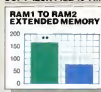
All times are given in seconds

SYMPHONY MACRO TEST



This Symphony macro test, developed by Tuff Tree Systems, creates and manipulates a large spreadsheet in 2 megabytes of expanded memory. The test measures both the speed of the memory boards and the efficiency of the expanded memory manager software driver in switching banks in and out of addressable memory space.

COPY 128K FILE 10 TIMES



This test uses IBM's VDISK program (supplied with DOS 3.1) to install two RAMdisks in AT extended memory. It then creates a 128K file and copies it ten times from one RAMdisk to the other in 128-byte blocks. Two of the PC expanded memory boards can emulate AT extended memory, so the test was run on those boards also.

■ AST RAMpage!
■ Average



The RAMdisk test of Lotus Intel Microsoft expanded memory is the same as the test for extended memory, except that the two RAMdisks were installed in expanded memory using the RAMdisk software supplied with each of the boards.

*AST's Fastdisk utility emulates a RAMdisk in extended memory

Symphony with Expanded Memory

Symphony 1.1 with expanded-memory support will be a boon to all those longing to create truly enormous spreadsheets.

With the release of its new Version 1.1 (which Lotus Development Corp. recently debugged), *Symphony* is now one of the few programs on the market that uses bank-switching techniques to take advantage of expanded memory—a particularly valuable feature for a program that eats as much RAM as *Symphony* does. Builders of monster spreadsheets should welcome it with open arms.

How well does it use all that RAM? PC Magazine Labs decided to find out, using the new *Symphony* on an XT with 640K bytes of conventional RAM and a 2-megabyte Intel Above Board/PC board installed. (See "Enlarging the Dimensions of Memory".)

Like other integrated programs, *Symphony*'s main selling point is that it lets you place all data—spreadsheet numbers, database records, document text, graphic image information, and telecommunications data—in a common workspace. This design assumes you can enter all data, no matter what it is, as values in the columns and rows of a worksheet; the data "type" you are working with doesn't get in the way of data integration.

As a result, a text document, for example, can include numerical information obtained from a financial report, and if you modify data in one place, any other documents using that data will be updated, too.

This method of integration, which is based on holding everything in RAM at the same time, has its limitations, however. The amount of data you can enter and the size of the worksheet you can build depend on the amount of usable RAM you have and how much memory the program can make use of.

You also constantly have to be aware of the cell "range" that a particular environment can use and be on the lookout for conflicts between one environment's range and that of another. Conflicts can occur even if you have previously set up

a "data range" that physically limits the movement of the cursor while working in a specific area. For instance, careless use of particular commands (such as Move and Erase) while you are editing text in a document area can overwrite or delete information in, say, a database area of the worksheet.

Expanded memory can overcome some of these limitations but not all of them. Expanded memory's most important function is to increase the amount of data you can enter and the size of the worksheet you can create.

Symphony requires at least 384K bytes of RAM to function on the IBM PC, but when the program is used on a 640K-byte system, about 440K bytes of RAM is shown to be occupied. This figure theoretically leaves about 200K bytes for storage of worksheet data, add-in programs (such as the *Symphony* spelling checker or the macro library manager), and setting sheets (forms that contain the settings for worksheets and windows).

Spreadsheet

A simple test shows that this available conventional memory (that is, memory within the 640K-byte PC limit) can be used up quickly when you are doing spreadsheet work. Filling the worksheet with the integer value 1 generates a "memory full" error message when only 89,300 cells have been filled. Filling the worksheet with the formula 1+1 only gets as far as 10,138 cells before the error message appears.

While I was checking these numbers, I discovered a problem with *Symphony* that occurs when you completely fill the conventional memory with integer values. The problem starts when the program detects that no space is left for adding any more integers; it returns the "memory full" message. If, however, you then delete some or all of the worksheet contents, the error message continues to flash on the screen.

At first, this message didn't seem to be much of a problem because it was possible to reenter large amounts of integer data in the same worksheet without complaints from *Symphony*; clearly the code that handles the internals of the active worksheet didn't see any memory problem. The trouble comes if you try to enter a formula, even such a simple one as 1+1. The part of the program that computes this formula seems to do some kind of check on memory availability and finds, erroneously in this case, that it hasn't got enough memory to proceed. Attempts to enter spaces generate an error message as well.

The problem does not seem limited to particular worksheet entries. If you want to use the Window or Print commands from the services menu, you find that they are not available because the memory error still persists. You can save and then retrieve the file to get around this problem, but it's annoying.

Although it might seem that 2 megabytes of expanded memory would solve this memory problem, it doesn't. When expanded memory is available, *Symphony* stores all labels (text) and real numbers (numbers containing a fractional part) in expanded memory, while blanks and integers remain in the available portion of the 640K-byte conventional memory.

When creating large worksheets, it is quite possible to fill up conventional memory with setting sheets, add-in programs, blanks, and integers and get a "memory full" error message while a large amount of expanded memory is still free.

Expanded memory is a great help, nonetheless. With the Above Board's extra 2 megabytes of memory, I was able to fill 74,295 cells with the formula 1+1, more than seven times as many cells as I could fill using conventional memory alone. However, don't equate more

(Sidebar continues)

CopyWrite

BACKS UP IBM PC SOFTWARE

Hundreds of the most popular copy-protected programs are copied readily. CopyWrite needs no complicated parameters. It needs an IBM Personal Computer, or an XT or an AT, 128k bytes of memory, and one diskette drive. CopyWrite will run faster with more memory or another drive.

CopyWrite is revised monthly to keep up with the latest in copy-protection. You may get a new edition at any time for a \$15 trade in fee.

CopyWrite makes back up copies to protect you against accidental loss of your software. It is not for producing copies for sale or trade, or for any other use that deprives the author of payment for his work.

To order CopyWrite, send a check for \$50 U.S., or call us with your credit card. We will ship the software within a day.



Quaid Software Limited

45 Charles Street East
Third Floor
Toronto, Ontario M4Y 1S2
(416) 961-8243

Ask about ZeroDisk to run copy-protected software from a hard disk without floppies.

EXTENDED VS. EXPANDED MEMORY

("Symphony with Expanded Memory" continued)

memory with greater speed. While *Symphony* operates quickly in conventional memory, its operations can slow down quite dramatically as you move closer to the 2-megabyte mark. Column inserts and deletions as well as moving large areas of data can take minutes.

Word Processing

When using *Symphony*'s word processing environment, it is unimportant that you are actually typing characters into a worksheet instead of a standard document format. You can use standard text-editing features; the only giveaway is a position indicator at the top of the screen that shows which worksheet cell the cursor is in.

You can create very large documents with the expanded memory installed. I managed to enter a 650K-byte text file before the program, whose performance degraded noticeably while I was working with this large file, became intolerably slow. Entering text near the end of the file was extremely difficult because word-wrapping often took 20 to 30 seconds per line.

Be careful of too enthusiastic a use of the PgDn or PgUp keys to move around in such large documents; after I repeatedly pressed the PgUp key in one case, *Symphony* displayed a "Stack overflow: call customer assistance" message and then promptly bombed. I lost the 650K-byte file in memory as a result.

Database and Communications

Without expanded memory, I was able to load a 30K-byte database file before the "memory full" error message appeared. With expanded memory active, this figure jumped up to an enormous

1.5 megabytes—it can go larger, but the program really begins to slow down so that additions and deletions become difficult to make. Clearly, the extra memory gives *Symphony*'s database management capabilities a whole new look. Users who have never felt that *Symphony* could handle large data-storage applications might now reconsider.

While the program's telecommunications environment is not directly enhanced by extra memory, it is now possible to capture large amounts of on-line data to a worksheet, where it can be transformed into database records using one of *Symphony*'s menu commands.

Summary

If you are already a *Symphony* user, you will find that expanded memory will give you new freedom to roam around parts of the worksheet you've never seen before. If you've been thinking of buying *Symphony*, the availability of expanded memory might tip the scales for you.

Generally, I found that *Symphony* worked well when it wasn't pushed to the limit; it only shows some signs of stress when you snipe at particular aspects of the program code while it is managing a tremendous amount of data in memory. (Theoretically, you can use 256 columns and 8,192 rows, but I ran out of memory a long time before that.)

The point is, however, that few people will ever need to go that far. If you can get another 10 years of income projections into a worksheet that you couldn't before, then you're doing fine. If you can create larger documents or enter many, many more records in a database, you'll be able to do your work more efficiently.

By recalling and then rereleasing the new version, Lotus has clearly made a concerted effort to rid *Symphony* of all dangerous bugs. Don't be afraid to take the jump up to expanded memory and start doing some of those fantasy worksheets you have always dreamed about.

—Robin Webster

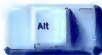
Robin Webster is a contributing editor of PC Magazine.

PC MAGAZINE

Symphony, Release 1.1
Lotus Development Corp.
55 Cambridge Parkway
Cambridge, MA 02142
(617) 577-8500
List Price: \$695

Requires: 384K RAM, one disk drive.
CIRCLE 807 ON READER SERVICE CARD

Pushy, pushy, pushy.



RESIDENT.[™] MOVE FROM PROGRAM TO PROGRAM WITH THE PUSH OF A KEY

Now you can go from application to application in a single key-stroke. With RESIDENT,[™] the product that makes different programs memory resident in your PC. Just name your own key to access your application.

SAVE TIME 26 WAYS. No more waiting to change programs. Go from Lotus 1-2-3[®] to Wordstar to DOS and back again. RESIDENT gives you instant access to as many as 26 programs. And ends stopping, searching and loading diskettes during the workday.

CUT AND PASTE. Take data (CUT) as it appears on the screen from any application and transfer it (PASTE) to any other application. For example, move columns from your spreadsheet to your word processor.

SOMETHING EXTRA. DESKTOP PROGRAMS. Desktop programs are simply another application for RESIDENT. Included free is Utility Package I, which has these programs: NOTE PAD, PHONE DIALER, CARD FILE, BASE CONV., CALCULATOR, ASCII TABLE, COMM. TERM., AND MESSAGE PAD.

AT A PRICE THAT'S NOT PUSHY. \$89.95.

RESIDENT does a lot. But it doesn't cost a lot.

And ordering it is almost as easy as using it. Just push a few buttons.

INFORMATION SOFTWARE, INC.
2639 Walnut Hill #135
Dallas, Texas 75229
For more information, call
(214) 353-2966

Microcomputers IBM PC, XT, AT, and 100% compatibles
PC DOS 2.0 or higher, and DOS 2.0 or higher
Technique. Not order processed. RESIDENT requires only 128
conventional memory for resident application.

Send this coupon with your credit card number (VISA, MASTERCARD, money order or check for \$89.95 plus \$5.00 for postage and handling. In Texas, add 6 1/4% sales tax (\$5.51). Outside the U.S. add \$10.00 (no U.S. \$-mark) for postage and handling. No C.O.D. please.

CHECK ☐ MONEY ORDER ☐ VISA ☐ MC

CARD # _____ EXP. DATE _____

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

PHONE NO. _____

RESIDENT is a trademark of Information Software, Inc. IBM PC, XT, AT are registered trademarks of International Business Machines Corporation.
LOTUS 1-2-3 is a registered trademark of Lotus Development Corp.
Wordstar is a registered trademark of WordPerfect International Corp.

Now it pays
to think before you write.

What goes for speaking goes for writing. Don't put words out until you've got your mind in gear.

We're going to give you a way to live by that very prudent rule. For a limited time, when you buy Microsoft® Word for your IBM® you'll get with it a very valuable extra, free: Ready!™ The new memory-resident outlining program from the same people who invented Think Tank.™

Word with Ready! saves a very thoughtful \$99.95.

If you go out to buy Ready! by itself, you'll pay \$99.95. So right off the bat thinking ahead will pay off. But, there's more than mere money to motivate you. Because together these two make precocious partners.

Word with its sophisticated editing and formatting features lets you get even complex jobs done faster. While Ready! makes the process of thinking through and organizing your writing quick and efficient.

And with Ready! sitting up
there all the time in memory,

its impressive organizational powers are just a keystroke away. Where you will find that an ounce of forethought is worth a pound of second thoughts, after thoughts, and I-wish-I'd-thought.

In fact, the outline you generate in Ready! can be transferred instantly and in its entirety to your Word document. A solid structure upon which to hang your arguments.

When it comes time to commit words to paper, Word will push letter quality and dot matrix printers to the limit. And drive laser printers to stunning feats. Producing at your desk manuscripts of quality not seen outside a printshop.

A relationship this good can't last.

And it won't. This whole deal will be history after February 28, 1986. After which you will have to purchase the perfect couple separately. And more expensively.

A fate you can avoid by seeing your Microsoft dealer now. While you still have that thought organized.

Microsoft
The High Performance Software™

For the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State and Alaska, (206) 825-8088. In Canada, call (416) 673-7638.

This offer is available only in the
U.S.A., its territories, and in Canada.

Microsoft is a registered trademark and The High Performance Software is a trademark of Microsoft Corporation. Ready! and ThinkTank are trademarks of Living Videonet, Inc. IBM is a registered trademark of International Business Machines Corporation.

Microsoft Word

Ready!

CRITERIA FOR CHOOSING A WORD PROCESSOR

OUTLINE PROCESSING

If the outline program is memory-resident, it won't use outline and the main document will be a linked outline into the word processor. If the outline would greatly facilitate the development of a calendar, a list, or a flow and call-out language.

11/11/11

Is There Intelligent Life in the PC?

Although manufacturers of new programs say their software exhibits artificial intelligence, nothing yet released for the PC truly lives up to that claim. But breakthroughs in AI research suggest that intelligent computers are possible.

The wildcatter was nonplussed. The computer in front of him seemed to have been surveying and tracking oil exploration in these difficult parts for years. He typed in another request far more complicated than any he had yet given the machine:

"Show me a map of all the tight wells drilled before May 1, 1980, but since May 1, 1970, by Texaco that show oil deeper than 2,000 feet, are themselves deeper than 5,000 feet, and are now operated by Shell."

No more than 10 seconds later a detailed map of the region, pinpointing with blinking yellow lights the specified tight-well outposts, appeared on the screen.

If the computer were a person, it would be called intelligent—and rightly so—for

its prodigious performance in these backhills, where mineral exploration expertise is at a premium. But crediting a computer with possessing intelligence requires a significant leap of faith. Most people would agree that before a computer deserves such a designation, it should earn its spurs by exhibiting far more cognitive skill than that required to quickly produce a group of landscape maps.

Brute Force

Actually, the Explorer, as the wildcatter's mineral-wise computer is known, is about as smart as a warehouse. It is an example of "brute-force" programming, which by cramming all the information needed to reach a solution into a computer's memory allows the computer to ap-

pear to think for itself by speedily searching through this data. In Explorer's case, a set grammatical path is programmed into the computer that enables it to understand the structure of all sentences; this path is similar to old-fashioned sentence diagramming. After a request is typed in, the computer searches for key words—objects and subjects—in a sentence and attaches them to loose verbs. It then reaches into its dictionary of words it will probably encounter and, by finding the words' definitions and usages, constructs the meaning of the sentence.

This is a useful approach as long as no sentence employs a word in a fashion that the computer's dictionary is not equipped to handle. For instance, if the wildcatter asked the computer, "Show me a map of



all the tight wells drilled before the opening of the longest running Broadway show." Explorer would be unable to react: It knows "show" as a verb, not as a noun. For the brute-force diagramming method to work in all instances, bigger and bigger dictionaries would constantly have to be devised, a task that would both tax the memory of the computer and slow it down considerably. Moreover, even if a computer included an immense number of words in its dictionary, it would still be nothing more than a dumb machine with a huge database, unable to build its own language understanding.

While Explorer is a mainframe, its limitations are precisely the same as those that plague the new generation of "software with artificial intelligence" for the IBM PC. These MS-DOS-based intelligent database managers, smart word processors, and expert systems fail to display any characteristics of cognition. They are merely stolid, brute-force computer programs that rummage through piles of data and thousands of captive facts in trial-and-error style. They retain those facts that help solve the problem; they discard those that are irrelevant. Finally such programs reach a conclusion or a solution based on the best information they have.

Logic-Line

Consider *Logic-Line Series 1*, from Clarity Software (Chesterland, Ohio). This sophisticated database manager perhaps comes closer to achieving its lofty aims than most other PC programs that claim to possess intelligence. Like a well-trained librarian or research assistant, it sifts through data and retrieves the most obscure and, at first blush, unrelated references using complicated parameters that you provide. For instance, when searching Patrick Henry's "Give me liberty or give me death" speech with the question, "What do you think about war?" *Logic-Line* retrieved two quite different statements. First, it found the obvious statement:

"The war is inevitable—let it come! I repeat it, sir, let it come."

But *Logic-Line* also retrieved a statement that bears a more abstract connection to the question:

"I hope it will not be thought disre-

spectful to those gentlemen if, entertaining as I do opinions of a character very opposite theirs, I shall speak forth my sentiments freely and without reserve."

Its ability to find two such diverse references in the Patrick Henry speech make *Logic-Line* appear intelligent. Skillfully, it is able to locate related information in text files that is well beyond the literal scope of the user's request. However, *Logic-Line*

To envision the process that an AI program employs, think of someone late for a formal party rummaging through a drawer for the one black bow tie there, tossing out pieces of clothing helter-skelter.

achieves its appearance of intelligence by a series of ingenious programming tricks.

Essentially, the program connects text references to search requests by first discarding the so-called noise words contained in each (the unimportant bridge words like *what, do, is, and*) and then looking for patterns among the key words in the search request (those words remaining after the noise words are tossed out) and the key words in the text files. To do this, *Logic-Line* tags each key word in both the search request and the text files with a numerical code. When these numerical codes match, it retrieves an excerpt from the database. During a search, *Logic-Line* performs a mathematical computation, not a symbolic one. Like Explorer, it is completely ignorant of the context of the words in the user's request and the text file; it is only aware of their pattern.

Sometimes, as its familiarity with the text file increases, *Logic-Line* reassigns these numerical codes so that the words can be taken less literally—a significant accomplishment for software. This technique enabled it to identify the second Patrick Henry statement as concerning his feelings about war. But even when it does such a numerical tagging shift, *Logic-Line*

is still doing pure pattern matching, not contextual matching.

Logic-Line is a paradigm of artificial intelligence software for the PC. While, admittedly, it is head and shoulders above many of its competitors, like the others it still relies only on brute-force computation to perform its tasks.

To envision in human terms the process that a so-called AI program for the PC employs, think of someone late for a formal dinner party rummaging anxiously and hastily through a drawer for the one black bow tie (relevant data) there, tossing out odd pieces of clothing (irrelevant data) helter-skelter. The trouble with this method of retrieval is that a complex problem can bog down even the fastest piece of hardware or software in its own imposing architecture. If the human brain, which operates so much more slowly than a computer, functioned in this formalized "read everything" fashion, the movement of life would be reduced to a paralyzing snail's pace.

What's the Difference?

If *Logic-Line* and its likes don't really possess true intelligence, does it matter? Some software developers feel that the continuing debate on whether these programs have cognitive skills or not is of little interest to users.

"If the purpose of my program is to get the train there at 10 o'clock, then that is all I am interested in achieving by any means or method," says Michael Pincus, one of the creators of *Logic-Line*. "I don't really care how the program works as long as it does work, does something useful, and fulfills its stated purpose. What we are trying to do is parallel human thought processes on the computer, not synthesize them."

Other software designers add that intelligence is such an elusive concept that it is of little concern whether artificially intelligent PC software actually has cognitive abilities or not. More importantly, they say researchers should judge computer intelligence according to different criteria than those used to recognize human intelligence.

By claiming that their programs are examples of artificially intelligent software, however, the developers of *Logic-Line* and

How Borland's Three New Holiday Packs Will Fill Your Stocking Without Emptying Your Piggybank.

Three special packs with dazzling discounts that will help get you into a Holiday mood. You can get some of Turbo, most of Turbo, or all of Turbo—including the two newest members of the Turbo family, Turbo GameWorks™ and Turbo Editor Toolbox™. You also get our unmatched 60-day money-back guarantee, quality products that aren't copy-protected.

TURBO NEW PACK \$95.00

You get the two exciting new members of the Turbo Pascal family.

- **TURBO GAMEWORKS**, Chess, Bridge, and Go-Moku, complete with source code and a 200-page manual.
- **TURBO EDITOR TOOLBOX**, all the building blocks to make your own editors and word processors, complete with source code and a 200-page manual.

TURBO HOLIDAY PACK \$125.00

You get all three of the Turbo family classics for only \$125.00 (about a 30% discount). Turbo Pascal 3.0 and Turbo Tutor and Turbo Database Toolbox—all for just \$125.00.

- **TURBO PASCAL** combines the fastest Pascal compiler with an integrated development environment.
- **TURBO TUTOR** teaches you step-by-step how to use Turbo Pascal with commented source code for all program examples on diskette.
- **TURBO DATABASE TOOLBOX** offers three problem-solving modules for your Turbo Pascal programs: Turbo Access, Turbo Sort, and GINST, which generates a ready-to-run installation program that lets you forget about adapting your software to specific terminals.

TURBO HOLIDAY JUMBO PACK \$245.00

This is it—the whole thing, the entire Turbo Family including its two newest members. You get:

- Turbo Pascal
- Turbo Graphics Toolbox
- Turbo Tutor
- Turbo Database Toolbox
- Turbo GameWorks
- Turbo Editor Toolbox

and you pay only \$245.00 for all six! Which means that you're getting everything at only about \$40 a piece. Quite a holiday deal. (And if you already own one or several members of the Turbo family, be creative—nothing can stop you from buying the Jumbo Pack, picking out the ones you already have and giving the rest as holiday gifts to family and friends. At these prices you can afford to give to others and to yourself.) Speaking of Holidays, this offer lasts until March 31, 1986. (At Borland, we like to make the Holidays last.)

CIRCLE 150 ON READER SERVICE CARD

BORLAND INTERNATIONAL

4585 Scotts Valley Drive, Scotts Valley CA 95066
Phone (408) 438-8400 Telex 172373

Copyright 1985 Borland International BI-1017

Turbo Pascal and Turbo Tutor are registered trademarks and Turbo Database Toolbox, Turbo Graphics Toolbox, Turbo Editor Toolbox, Turbo Pascal, and MicroLink are trademarks of Borland International, Inc. Turbo Pascal is a trademark of Microsoft International Corp. Multi-User is a trademark of National International Corp. Microsoft is a registered trademark and Word is a trademark of Microsoft Corp. WordPerfect is a trademark of WordPerfect Software International.



NEW!

TURBO GAMEWORKS \$69.95

Our new Turbo GameWorks offers games you can play and replay without Turbo Pascal or revise and rewrite with Turbo Pascal 3.0. We give you the source code, the manual, the diskettes and the competitive edge. Chess, Bridge and Go-Moku.

State-of-the-art games that let you be player, referee, and rules committee all at once because you have the Turbo Pascal source code. Learn exactly how the games are made—so you can go off and make your own. And Turbo GameWorks is the only quality game you can get that is not copy-protected. Sold separately, only \$69.95. (Just \$47.50 if you buy the Turbo New Pack.)

NEW!

TURBO EDITOR TOOLBOX \$69.95

Build your own word processor—for only \$69.95!

You get ready-to-compile source code, a full-featured word processor that looks and acts like WordStar™ and a 200-page manual that tells you how to integrate the editor procedures and functions into your programs. With Turbo Editor Toolbox you can have the best of all word processors. You can make WordStar behave like Multi-Mate. Support windows just like Microsoft's Word. And do as fast as WordPerfect does it. Incorporate your new "hybrids" into your programs to achieve incredible control and power. Sold separately, only \$69.95. (If you buy the Turbo New Pack, the price drops to just \$47.50.)

Holiday Gift Packs, Turbo GameWorks™ & Turbo Editor Toolbox™

Available at better dealers nationwide. Call (800) 555-2283 for the dealer nearest you. To order by Credit Card call (800) 255-8008, CA (800) 742-1133

Quantity

* Turbo Holiday Jumbo Pack	\$245.00	_____
* Turbo Holiday Pack	\$125.00	_____
* Turbo New Pack	\$69.95	_____
Physical		
Pascal v1007	\$109.90	_____
Pascal v1007 and BCD	\$124.95	_____
Turbo Database	\$34.95	_____
Turbo Graphics	\$34.95	_____
Turbo Tutor	\$69.95	_____
Turbo Editor	\$69.95	_____
Turbo GameWorks	\$69.95	_____

These prices include shipping to all U.S. cities. All foreign orders add \$10 per product ordered.

Amount: ☐ A/C and 6% tax ☐ MC ☐ Check ☐ Bank Draft

Payment: ☐ VISA ☐ MC ☐ Check ☐ Bank Draft

Credit Card Expiration Date: _____ / _____

Card # _____

CCD's and Purchase Orders will not be accepted by Borland International. California residents: add 6% sales tax. Outside USA: add \$10 and make payment by bank draft payable to U.S. dollars drawn on a U.S. bank. H7

***Gift Pack
Offers Last
Until March 31,
1986**

The holiday packs include an upgrade coupon for 200 users so you get BCD and BCD support for \$29.95 regularly \$15.00

Carefully describe your computer system

Model is: _____ bit _____ bit
I use: _____ PC-DOS _____ MS-DOS
My computer's name and model is: _____

The disk size I use is: ☐ 31K ☐ 51K ☐ 8"

Name: _____
Shipping Address: _____
City: _____
State: _____ Zip: _____
Telephone: _____

NOTE: Turbo Editor Toolbox and Turbo GameWorks are available for the IBM PC and its compatibles using Turbo Pascal 3.0 (DOS 1).

similar packages are perpetuating a basic confusion about the definition of AI that has hampered the progress of this field practically since its inception.

Artificial intelligence as a discipline first went public in 1956 at a Dartmouth University conference after 10 years of relative obscurity. This research had, from the start, one basic goal: to make computers and software that in broad ways think,

understand language, and possess vision.

Unfortunately, that goal was sidetracked by the Dartmouth conference's showstopper: the Logic Theory Machine. This computer did one thing well: It was able to prove the geometric theorems set forth in Whitehead and Russell's masterwork, *Principia Mathematica*. Moreover, it did so more quickly than most mathematicians—and in at least two cases, its solu-

tions were far more efficient and more creative than those reached by its human counterparts.

But the Logic Theory Machine was not intelligent; it was nothing more than the most prodigious data manipulator yet created. It had only high-level, preset, and limited pathways of reasoning, based on high-level, preset information about mathematical theorems. The machine was inflexible and could not adjust to more mundane problems, as true intelligence can.

Nevertheless, because of its remarkable output as an advanced mathematician, the Logic Theory Machine made a big impression. As Herbert Simon, a Nobel Prize winner who, with Alan Newell, created the Logic Theory Machine, put it soon after the Dartmouth conclave: "There are now in the world machines that think, that learn, and that create."

Simon's statement and his computer were such an impressive promotional pitch for artificial intelligence that researchers in 1956 embraced them with open arms. And in their eagerness to rally behind the Logic Theory Machine, they never looked behind its curtain to uncover the programming legerdemain.

The sad fact is, however, that this one computer program set back the discipline by as many as 20 years. For as exaggerated word of its abilities spread throughout the fledgling AI community, imitators proliferated. Attempts to design new models of the mind were shelved. Instead, creating machines that worked like the Logic Theory Machine, based on the same brute-force programming and data manipulation methods, took up almost everyone's time throughout the 1950s and 1960s.

Ultimately, the Logic Theory Machine and its imitators ran their course. The emphasis in the discipline has changed so that now most of the researchers are far more interested in understanding specific, human mental processes and in modeling them on a computer. The breakthroughs emerging from the AI field come from research in expert systems, natural language, and robotic vision (see accompanying sidebars).

The Real Thing

Despite any statements to the contrary, AI researchers have found that intelligence

Natural-Language Research

Embedded "scripts" of predictable word meanings may be the key to true language understanding for computers.

The effort to teach computers to understand languages as they are spoken by people, despite all their conceptual nuances, is an important area in AI research. The major force behind this effort is Roger Schank, the dean of the computer science department at Yale University.

Schank and his 30 or so colleagues at the school feel that the key to language recognition in humans—and, thus, in computers—is what they call a *script*. A script, according to Schank, is a standard sequence of events that is repeated frequently enough for people to remember it as a related whole, as one would recall the story line of a play. Put another way, a script is essentially a human memory compartment in which people store predictable day-to-day scenarios. We unconsciously retrieve the relevant script, Schank says, each time we attempt to understand a spoken or written word.

Whether people are as reliant on scripts to understand language as Schank claims is debatable, but it is inarguable that applying this one notion to computers has already produced programs able to assimilate and explain statements entirely new to them, and, more importantly, remember and learn from their deduced meanings for future use.

For instance, Schank's group programmed one computer at Yale with a very basic script about terrorism. At first it knew no more than a reasonably cur-

ious teenager would glean from a simple awareness of the world, but it augmented its knowledge of the subject, unprompted, by reading UPI reports out of such hot spots as Northern Ireland and the Middle East. After reading only about 20 accounts of terrorist actions around the world, it was given the following short news wire lead:

BELFAST—A disgruntled Catholic gunman shot and killed a part-time policeman at a soccer match and escaped through the crowd to a waiting getaway car.

Asked to explain this report, the computer responded: "A member of the IRA, allied to the Catholic cause, attacked a member of the establishment, a policeman, killing him." Because of its embedded script and what it learned since receiving the terrorism script, the computer was able to accurately describe what had occurred in Belfast, despite the fact that the news text never mentions the IRA nor identifies whether the policeman represented the pro-British establishment.

This accomplishment points in a significant direction that artificial intelligence researchers can follow in teaching machines to understand language in its fullest form and not just as numerical, computer-originated patterns.

—Jeffrey Rothfeder

Borland Introduces Reflex, The Greatest Analytical Tool Since The Couch

INTRODUCING REFLEX, THE ANALYST.

If you use Lotus 1-2-3™, dBASE® or PFS File™, you need Reflex™—because it's a totally new way to look at your data. It shows you patterns, relationships and interrelationships you didn't know were there, because they were hidden in data and numbers.

Reflex is the first database that separates the trees from the forest. The first database that understands that what you see depends on how you look at it.

The first database that probes relationships—then shows them to you in various graphic forms—scatter, line, bar, stacked bar and pie charts.

The first database to break the bonds of traditional DBMS (Data Base Management Systems) and give a dramatic visual turn to data analysis.

Reflex makes graphic leaps far beyond 1-2-3. With Reflex, when you look, you see.

HOW THE CRITICS REACT TO REFLEX

"The next generation of software has officially arrived."

Peter Norton, PC Week

"Reflex is one of the most powerful database programs on the market. Its multiple views, interactive windows and graphics, give report writer, pull-down menus and cross tabulation make this one of the best programs we have seen in a long time. The program is easy to use and not overwhelming to the novice. Reflex not only handles the usual database functions such as sorting and searching, but also 'what if' and statistical analysis. It can create interactive graphics with the graphics module. The separate report module is one of the best we've ever seen."

Marc Stew, InfoWorld

"What you see, then, is an interesting hybrid of a database and a spreadsheet that is ideal for analyzing tabular data."

Adam B. Greve, InfoWorld

"More flexible than spreadsheets, this easy-to-use database analysis package presents information with visual clarity. Reflex is for you. The flexibility of switching between different views of the data lets you see relationships you may have previously overlooked. Without 'what if' analysis, key variables—such as cost of goods sold or travel expenses—may be out of hand but unexamined. The type of analysis to uncover such a failure is awkward to do on a spreadsheet, yet, it may mean the difference between success and failure in a competitive situation."

Ita H. Krawak, Business Computer Systems

REFLEX OPENS MULTIPLE WINDOWS WITH NEW VIEWS AND GRAPHIC INSIGHTS.

You use Reflex's Form View to build your database; the List View lets you put data in tabular List form; the Graph View gives you instant interactive graphic representations; the CrossTab View gives you amazing "cross-referenced" pictures of the links and relationships hidden in your data. Report View allows you to import and export data to and from Reflex, 1-2-3, dBASE, PFS File and other applications and prints out information in the formats you want. In fact, Report View is probably the best 1-2-3 report generator you can buy today. It's also the cheapest—and you're getting all the other features free.

The commands for all five Views are consistent—so you're not stuck learning five different ways to get something done. And because Reflex uses advanced windowing techniques, you can see several views on the screen at the same time—without having to switch back and forth. You get the picture—and the pictures—all at once—if that's the way you want to look at things.

Modify a number and all your Views—List, Form and Graph—are immediately updated, on-screen. Changing a number changes the picture—which is mighty handy when you're analyzing (let's say) sales figures by salesperson; or you're in "What if?" country asking yourself "What if we could add 2.5% in January sales?" "Show me."

"Give me the picture." "Show me what happens when we shift 11% of Nebraska's inventory to the new store in Hawaii."

"Show me how many Gizmo 28's we have in every store in every state as of midnight last night and what happens to our East Coast stocks if the shipping strike lasts more than a week." "Show me."

So Reflex shows you. Instant answers. Instant pictures. Instant analysis. Instant understanding.

HOW IN THE WORLD CAN BORLAND SELL A PHENOMENAL PRODUCT LIKE REFLEX FOR ONLY \$99.95?

At \$495.00, Analytica's original price, Reflex was a bargain. Acclaimed by critics and praised by users, Reflex also got our attention at Borland International. We were so impressed by Reflex that we bought the company!

To celebrate that, we're making business software history by offering Reflex—FOR A LIMITED TIME—for ONLY \$99.95! (Offer good through March 31, 1986).

That's \$395.05 off the original price—which is a pretty good return on your toll-free phone call.

We think Reflex should be an "automatic product," a "standard" that every PC owner should own. That's why we priced it at \$99.95. Naturally we've added our 60-day money back guarantee and Borland's Reflex is not copy protected.



**BORLAND
INTERNATIONAL**

4595 Santa Valley Drive, Santa Valley CA 95066
Phone: (408) 438-6900 Telex: 173275

Trademark: Reflex is a trademark of Borland International Inc. Lotus is a registered trademark and Lotus 1-2-3 is a trademark of Lotus Development Corporation. dBase is a registered trademark of Ashton-Tate. PFS is a registered trademark and PFS File is a trademark of Software Publishing Corporation. IBM PC, XT, AT, PS, and IBM and IBM Corp. logos are registered trademarks of International Business Machines Corporation. Borland International Company Card is a trademark of Borland International Company.

CIRCLE 147 ON READER SERVICE CARD

REFLEX™

THE ANALYST™

To order by Credit Card call (800) 255-8008, CA (800) 742-1133
Available at better dealers nationwide. Call (800) 556-2283 for the dealer nearest you.

YES! Rush
Reflex to me
Send me _____ copies.

**60-DAY
MONEY-BACK
GUARANTEE**

\$99.95

This price includes shipping to all U.S. cities. All foreign orders add \$10 per product ordered.

System requirements:
IBM PC, XT, AT and compatibles; 286 RAM; minimum 1MB; Hard Disk (20MB); Display: VGA or equivalent; PC DOS 2.0 or greater; Hard disk and mouse (optional).

Submit!
(CA res. add \$6 per copy)
Amount Enclosed ☐ VISA ☐ MC ☐ BankDraft ☐ Check
Credit Card Exp. Date _____
Card # _____
Name _____
Shipping Address _____
City _____ State _____ Zip _____
Telephone _____

COOs and Purchase Orders WILL NOT be accepted by Borland. California residents add 6% sales tax. Outside USA, add \$10 and make payment by bank draft (Borland in US dollars) or US funds.

Copyright 1985 Borland International, Inc. 0550 A

is not a nebulous concept that conveniently varies with the person explaining it. Intelligence has a very simple definition. It is the ability to learn or understand from experience and to respond successfully to a new situation; it can make judgments, associate relevant information and synthesize new knowledge from such associations, and reach wholly unique and accurate conclusions for a given situation. At this point, no PC software program can rightly claim to live up to even a part of that definition.

Users of PC artificial intelligence software have yet to see the real thing. Neither have most mini and mainframe users, for that matter. However, artificial intelligence researchers at universities all over the country, who have been feverishly attempting to bridge the chasm between human intelligence and machine intelligence, now have impressive successes under their belts.

Researchers have developed computers that can understand complete sentences, despite fractured syntax and structure, and even form their own definitions for new words in those sentences. Other computers are beginning to visually recognize objects even if they are nearly obscured by other objects. New expert systems can juggle several hypotheses and subjects at once—the way humans do—and then offer conclusions and judgments based on a cosmopolitan understanding of the real world. There are even computers able to learn new skills or master new topics by using analogies to compare them to those they already understand.

As these breakthroughs in hardware and software design suggest, AI is a discipline with an important agenda. When artificial intelligence is perfected in the research labs and then migrates down to the microcomputer, PC users will be able to talk to their computers on human terms, using English commands with a free-wheeling structure and obtain computer advice and aid that are truly unique—not based on a preset line of reasoning. The AI programs on the horizon for the PC—based on today's most advanced research, include:

- Database managers and spreadsheets that present a range of answers to any one request. For instance, while it helps you to build a 5-year business plan, the software

will, besides computing the figures, suggest partial and best-case scenarios and strategies by sifting through its extensive knowledge of, say, business plans, mergers, and product life-cycles and creatively associating this stored information with the new statistical data.

- Word processors that construct correspondence from your bare-bones thoughts. These programs will also correct misspellings and mistakes of fact as you write, and alert you. A notation on the screen might say: "The capital of Illinois is not Chicago but Springfield. Do you want to have this error changed in the copy?"

- Software without complicated, confusing manuals. These programs, by asking you questions and remembering your progress, will automatically turn off menus when you have learned less cumbersome command structures and guide you on-screen through program shortcuts that you seem to be avoiding, forgetting, or not understanding.

PC Software

If today's self-proclaimed PC AI programs are not yet the genuine item, how valuable are they? By and large, they are extremely important links in the chain of

Expert-Systems Research

AI researchers are devising ways to bypass the need for IF-THEN rules in an effort to make today's expert systems more intelligent.

Expert systems have grabbed the most publicity of all artificial intelligence achievements and for good reason: They are working well over a broad range of difficult tasks. These programs, which capture the knowledge and reasoning of human experts, are used to aid in diesel-engine repair; others troubleshoot telephone-line failures; and still others delve into such complex areas as interpreting human pulmonary-function test results and analyzing chemical molecular structures.

But while all of these programs exhibit certain clear signs of intelligence—they can make judgments, associate relevant information and create new knowledge from them, and reach unique and accurate conclusions for each situation—they are limited in scope. The term *intelligence* implies the ability to understand beyond narrow boundaries; these expert systems are simply unable to leap beyond the constraints of their disciplines.

For instance, one of the oldest expert systems, Mycin, diagnoses and recommends drug treatments for blood and meningitis infections. On the one hand, Mycin is impressive: To test its abilities, a group of its findings were submitted to medical experts in its field for evaluation;

in 90 percent of the cases a majority of the judges said that the program's decisions were the same as or better than the decisions they would have made. But on the other hand, Mycin lacks even the most basic medical worldliness.

"As we got to know Mycin well, we realized that there was a huge amount the system simply did not know," says Dr. Edward Shortliffe, one of Mycin's designers and currently an assistant professor of medicine and computer science at Stanford University. "Mycin knew about blood bacteria and meningitis bacteria, but it was hardly an infectious-disease expert. It knew nothing about pneumonia, urinary tract infections, brain abscesses, and many other important infectious diseases. It would be risky to use as a consultation system and to tell hospitals, 'Here's an infectious-disease consultation system, but use it only in the case of bacteremia or meningitis.' To this day, people are experimenting with the system and trying to run cases of venereal disease through it. Of course, it always fails."

Mycin is restricted by its programming. Although it goes well beyond brute-force methods and can literally develop new knowledge by creatively asso-

software evolution. Most of them are well programmed and innovative and incorporate enough enhancements over traditional software to permit their developers to label them unabashedly as AI, however incorrectly. Besides *Logic-Line*, at least a dozen other programs fit into the same genre of well-designed pretenders to the AI throne.

Management Edge from Human Edge Software Corp. (Palo Alto, California) is a business adviser system that attempts, through interactive dialogue, to help managers improve their performance and raise productivity. To truly merit the title "intelligent program," however, it would have

to possess several important characteristics, like those of a human adviser: the ability to learn from experience as it interacts with a variety of users, so it can give flexible advice; the ability to understand and respond to answers more complex than yes and no; and the ability to give unique advice to each user that considers how well that user has been able to implement earlier advice. Its brute-force programming methods do not permit *Management Edge* to fulfill any of these criteria.

SAVVY PC from Excalibur Technologies (Albuquerque, New Mexico) and

Q&A from Symantec (Cupertino, California) are similar to *Logic-Line* and suffer from the same core problems, which keep them from passing for intelligent software. Their natural-language interfaces are simply too strongly based on pattern recognition to represent true cognition.

Placing expert-system software shells, such as *Xi* from Expertech Ltd. (London, England) and *Expert Ease* from Human Edge Software, in the category of artificial intelligence is perhaps the most egregious error to emerge from the confusion about the definition of AI. These programs have a long way to travel before they can be considered sophisticated expert-systems designers.

To design a truly intelligent expert system requires many years of "knowledge engineering," the process of dragging information, knowledge, and rules of thumb out of an expert in a particular field and building a program out of it. And after the knowledge engineering is done, designers spend an equal amount of time tinkering with the information, making sure that it is pure, that it is not contradictory, and that it results in effective advice. The current crop of PC-based expert-systems shells are, for the most part, able to handle only the most basic elements of knowledge: statements like, "If the account is 90 days past due, then mail out a reminder notice." They can't approach the complex knowledge synthesis that large-scale intelligent expert systems attain. And these PC expert-system shells have none of the massive knowledge-purity, error-checking features necessary for a true expert-system builder.

Outer Flaws

All of these PC "artificial intelligence" programs are capable and useful as far as they go. But in addition to their internal, brute-force programming flaws—often hidden from the user—each also suffers from one or more chronic external deficiencies that immediately unmask them as mere AI masqueraders.

For one, too much of these programs' documentation is complicated and diffuse enough to make you think frustrating manuals like *WordStar*'s a dream. AI, by definition, is supposed to make hardware and software more human and understandable,

ciating data in its memory, the IF-THEN rules that make up its architecture weaken it and limit its freedom. IF-THEN rules are simply unable to convey the vast possibilities that lie in each piece of information. For instance, if you were creating an expert system to predict the weather, one of the rules that you would probably write would be

IF cumulonimbus clouds are present, and the humidity is 75 percent or higher, and the sky is a dark gray,
THEN
there is a strong certainty (.8) that it will rain within 1 hour.

While this rule is useful and accurate most of the time, there is an error of omission that is not immediately obvious but could be critical if this expert system is to predict the weather. Even if all the antecedents are found to be correct, a solar eclipse, not a rain storm, may be ensuing. A human weather expert would know that an eclipse is an uncommon but not impossible occurrence. The expert system, on the other hand, tied inexorably to its limited rules, cannot fathom such an event. Moreover, if the possibility of an eclipse is programmed into the expert system, its complex of rules would become unwieldy—and slow.

To skirt the limits of expert systems, a growing number of research projects are attempting to bypass the IF-THEN rule

structure and enable these programs to juggle more information efficiently. One of the most impressive of these research projects is that of Dr. James Reggia, a neurologist at the University of Maryland Hospital in Baltimore. Reggia found that people reach conclusions after juggling interim hypotheses and probing their validity long enough to prove one or more of them correct. Unlike traditional expert systems, which consider information serially, piece by piece, people think in parallel by considering a group of possible conclusions at once, Reggia says.

To get closer to this simultaneous information processing in an expert system—something that, by necessity, demands that the software be able to juxtapose and assess knowledge from a variety of areas—Reggia is building software that uses what might be called "thought frames" instead of IF-THEN rules. Each thought frame is like a miniature traditional expert system and, thus, each frame can reach conclusions on its own from within a limited sphere of information. These conclusions are then matched up against the judgments reached by the other thought frames in the software, and eventually one or more wins out for its clearness of purpose.

Reggia's new expert system is just one of many on the drawing boards. They point to an entirely new generation of expert systems divorced from the traditional weaknesses and limitations of IF-THEN rules.—Jeffrey Rothfeder

not more complex and machinelike. Take, for example, this excerpt from the manual of a database manager with a natural-language interface:

"You have your choice of three kinds of searches. (1) The first kind is a simple word search and data retrieval. (2) The second kind is an intelligent associative element search of which there are three types: convergent, divergent, or all-associative. (3) The third type is an *a priori* (or given word set) type cross search where questions, sentences, paragraphs, lists, or any type of natural-language structure can be used to cross-interrogate a file or group of files."

If this program is supposed to under-

stand natural language, why isn't its manual written in plain English?

Expert systems or adviser software are the worst example of a second common deficiency. These programs, which offer advice on issues from negotiations and management to how to keep fit, are often little more than set-in-concrete statistical tables presented in a palatable and interesting form. Most of this software is built on a rigid "test" structure: for example, a psychological program might present you with a questionnaire that determines whether you are extroverted, introverted, or neither. All the program's later responses and advice would be based on that simplistic categorization of your much more

complicated personality. Such a program leaves little room for the gray areas of real life. True intelligence must be flexible.

When true artificial intelligence finally arrives on the PC, it should simplify traditional applications, not make them more cumbersome. Many of today's "AI" programs actually do the opposite. For instance, the manufacturer of a recently released word processor claims it's intelligent because it "thinks ahead of you as you type." If you start a sentence with the letter *T*, a menu of words—*the, their, they*, and so on—appears on the screen. If you find the word you are going to write in the menu, you type a corresponding number and your chosen word appears at the

Robotic Vision Research

Teaching a robot's computer brain to recognize entire objects from seeing only a part may enable these machines to leave the AI lab for the factory.

Teaching computers to see is one of the most difficult items on the artificial intelligence agenda. Unlike language understanding or decision making, vision requires an exacting cooperation with the external world.

Machine vision has reached the point where robots can consistently recognize two-dimensional, black-and-white objects, but only if they are completely unobscured by neighboring objects and contrast sharply with their backgrounds. Unfortunately, to achieve this ability, the computer has had to use the brute-force method of data retrieval. The computer takes a picture of an object with a video camera, digitizes it, and then compares it with the digital coding given to the objects in its memory. When a picture matches its memory of the picture, the computer identifies the object.

The problem with using this method to make computers see is three-fold: Searching through all the pictures in its memory is a time-consuming process, especially as the computer's dictionary of objects grows; the objects the computer is viewing may be stacked at different angles and the computer's memory models have to be prepared for each angle; and if an object is at all obscured, the vid-

eo camera is unable to take a full-blown picture of it and the computer will not adequately match the video picture against its memory models.

As one machine vision researcher put it: "The system doesn't work if a robot takes a half-hour to decide whether it is going to crash into a wall in the next 30 seconds or perhaps is so confused that it never makes a decision at all. Brute-force calculation is simply inadequate for visual processing in real time."

One of the most important machine vision projects currently under way is the Local Feature Focus program led by Robert Bolles and Ronald Cain at the Stanford Research Institute's Artificial Intelligence Center in Palo Alto, California. Bolles and Cain designed their Local Feature Focus for computer vision after investigating how people see.

"How does a person find a can opener in a drawer of kitchen utensils?" Bolles asks. "If it is partially obscured by other objects, as it probably is, they recognize one of its local and distinctive features, such as a slightly curled, pointed piece of sheet metal, and then use it to hypothesize the position and orientation of the whole object. When I was a kid, I could identify a '57 Chevy by its taillight. That

one individual feature told me a lot about the whole object. Somebody could have bolted the wrong taillight onto a '58 Chevy, but over 99 percent of the time I was right."

Following this line of reasoning about vision—that is, that individual features of an object give us shorthand clues to the identity of the whole object—Bolles and Cain have developed a computer with video eyes that home in on certain distinct features of an object rather than attempting to identify the entire image at first whack. Once the computer recognizes key features of an object, the theory goes, it can use that knowledge to identify the entire object.

Other computer vision research projects go well beyond in scope what Bolles and Cain are doing at SRI, but up to now none have been as successful in producing tangible results. The Local Feature Focus computer can identify car parts that are severely obscured by other objects, though it may take it 5 to 10 minutes to accomplish this. But this slow speed should improve soon. Bolles and Cain expect to see their computer, or others on the drawing boards like it, in industrial and factory settings in the near future. —Jeffrey Rothfeder

beginning of the sentence. This process continues with each word in the document. Not only is this product not an example of artificial intelligence—it is merely a fast program with a large dictionary—it is useless as a word processor, even in traditional terms. I can't imagine how this kind of "stutter-stop" typing would speed up writing.

Hype versus Reality

Interestingly, although many software manufacturers have succumbed to the allure of using "artificial intelligence" as a marketing buzzword, they are often more cautious when discussing their products with a reporter. "Is *Management Edge* a supersophisticated expert system?" asks Jim Johnson, president of Human Edge Software. "The answer is no. The value of the program is that it incorporates 6 or 7 man-years of reading in the area of management techniques—that's 4,000 to 5,000 papers and almost any book on the subject in the Stanford Library—and it tailors this knowledge to your particular problem. It doesn't learn and it doesn't interact overly much with you. It just presents knowledge."

Most experts contend that technological considerations are holding back AI on the PC. Chief among them is the lack of storage space in the computer. AI researchers have found that they need huge amounts of memory to process symbolic concepts and data; mathematical computations, by contrast, can fit quite well onto smaller computer systems. When parallel processing architecture arrives for the PC, it may help eliminate this constraint, but don't look for it for a few years yet. Also, more advances in natural-language concepts, voice technology, and robotics are needed before true artificial intelligence can be implemented on micros.

Precisely because artificial intelligence is a difficult concept to pin down, few PC software companies are willing to develop very strong relationships with the AI research community. Most say that they will continue to enhance their PC "artificial intelligence" products using traditional mathematical data processing until cognitive computing matures enough to be included in general applications software for the microcomputer. One of the few com-

panies that is willing to gamble with a more research-oriented approach to AI is Lotus Development Corp.

Recently, Lotus showed its interest in AI by hiring Jerry Kaplan, a cofounder of Teknowledge, a leading commercial artificial intelligence company, to develop and design software based on AI techniques. Kaplan is building a program that will help structure the workday for executives with highly varied work loads. As Kaplan describes it, the software will primarily organize ideas, notes, information, and schedules. And where will artificial intelligence creep into this product? "The program will have to be able to, with intelligence, prioritize a massive amount of cluttered input and determine in what order and in what form the executive should handle the jobs," Kaplan explains.

Although Lotus is reaching out to the artificial intelligence community for techniques and ideas, it has no plans to market this program—or any other—as possessing artificial intelligence. "Don't expect to see Lotus touting a program as artificially intelligent," says Kaplan. "Rather, our approach is to treat AI as a programming tool, a way to build better business applications. Treated as a software technology, AI should be used to develop better interfaces, including natural language and non-keyboard interfaces; to allow people to interact with programs more familiarly and

comfortably; and to permit low-level symbolic reasoning."

In contrast to Lotus's low-profile approach, firms like Clarity Software essentially claim to have perfected AI in their programs. The conflict, then, between true artificial intelligence and PC "artificial intelligence" will likely continue. Still, some observers believe much of the confusion will disappear as PC software evolves.

"Okay, it's not artificial intelligence in the classic sense," says Nels Winkless, a consultant to high-tech ventures and one of the developers of *SAVVY PC*. "In fact, it's a giant muddle. But take comfort that as soon as the definitions become clearer—as soon as artificial intelligence defines its discipline better and the developers of PC software with artificial intelligence market their purpose better—the dust will settle and what remains will be a lot of good software for the IBM PC, however you want to categorize it."

In looking for intelligence in the PC, use the same common sense as you would searching for intelligent life. Don't assume that a plant is intelligent because, for survival's sake, it turns toward the sun. ■

Jeffrey Rothfeder is the author of Minds over Matter (Simon & Schuster, 1984), a study of the history and current state of artificial intelligence research.



Borland introduces Traveling SideKick. It's your SideKick's™ sidekick.



What's inside the Organizer Binder

- ADDRESS BOOK SECTION**
PRE-PRINTED FORMS WITH DIVIDERS AND TABS FOR EASY REFERENCE
- PHONE DIRECTORY SECTION**
PRE-PRINTED PHONE DIRECTORY
COMPUTER OR MANUALLY UPDATED
- MISCELLANEOUS SECTION**
TO STORE ALL EXTRA PRE-PRINTED FORMS
AND COMMONLY USED RECORDS
- REFERENCE SECTION**
CONTAINS MAPS, TIME ZONES,
BUS TRAVEL, VISA/AGENTS TRAVEL,
ACCOMMODATIONS, ETC.
- FINANCE SECTION**
EXPENSE REPORTS, RECEIPT LOG AND
STORAGE ENVELOPE, CREDIT CARD
INFORMATION, ETC.
- CALENDAR SECTION**
YEARLY, MONTHLY, WEEKLY AND DAILY
CALENDAR WITH APPOINTMENT
SCHEDULER
- PERIODIC SECTION**
A "RIGHT NOW" SECTION FOR CURRENT
PROJECTS, MEETING NOTES, ETC.
- STORAGE POCKETS**
FOR BUSINESS CARDS, CALCULATOR OR
RECEIPT STORAGE, ETC.
- TRAVELING SIDEKICK SOFTWARE**
A REPORT GENERATOR TO CONVERT, PRINT
AND UPDATE ALL INFORMATION

Traveling SideKick is the organizer for the Computer Age!

Traveling SideKick is both a binder you take with you when you travel — and a software program — which includes a Report Generator — that generates and prints out all the information you'll need to take with you. Information like your phone list, your client list, your address book, your calendar, and your appointments. (The Appointment Schedule or Calendar you're already using in your SideKick is automatically used by your Traveling SideKick. You don't waste time and effort re-entering information that's already there.)

One keystroke generates and prints out a form like your Address Book. (You don't need to change printer paper.) You simply use a standard 3-hole punch — which you can steal from someone else's desk — punch out the holes, fold and clip the form into your Traveling SideKick binder — and you're on your way. Because Traveling SideKick's binder and software are CAD (Computer Age Designed), you don't fool around with low-tech tools like scissors, tape, or staples. Just one keystroke. 3 holes and you're on your way.

You don't have a SideKick? You must be kidding.

More than half a million people already use Borland's desk-top organizer, SideKick. (Winner of InfoWorld's "Product of the Year" award. It is also the #1 best-seller for the IBM PC®.) Anyway, if you don't have one already, you need one now and we'll give you a special price break. Buy Traveling SideKick and SideKick for only \$125.00. (Sold separately, they add up to \$154.90, so you save \$29.90 — which we hope you don't have to spend on antiques to the plastic material Airlines call "food".)

What the software program and its Report Generator do for you before you go — and when you get back.

Before you go:

- Prints out your Calendar, Appointments, Addresses, Phone Directory, and whatever other information you need from your data files.

It can also:

- Sort your address files by name, zip code, or company name
- Print mailing labels
- Print information selectively
- Search files for existing addresses or calendar engagements

When you return:

- Lets you quickly and easily enter all the new names and numbers, facts and figures you learned while you were away — into your SideKick data files.
- Traveling SideKick does all of the above and more without needing special computer paper.

If you use SideKick, you need Traveling SideKick.

Since you use SideKick, you already know how incredible and invaluable it is. And you now know that Traveling SideKick uses all the information you already have in your SideKick. No retyping. No re-entry. It's that easy.

Sold separately, Traveling SideKick is only \$69.95 which is a lot less than many "dumb" organizers that are nothing more than printed books that can't generate anything except dust. (Because Traveling SideKick is electronic, it works this year, next year, and all the "next years" after that. Old-fashioned low-tech organizers are history in 365 days.) You'll be proud of your Traveling SideKick binder on planes and boats and trains. It's stylish, professional, and practical. It belongs — with you — in the Computer Age — and for only \$69.95, it belongs to you.



BORLAND
INTERNATIONAL

4585 SCOTT VALLEY DRIVE, SCOTT VALLEY, CA 95066
PHONE (408) 438-8400 TELEX 172273

SideKick is a registered trademark and Traveling SideKick is a trademark of Borland International, Inc. WordStar is a registered trademark of Borland International Corp. Lotus is a registered trademark of Lotus Development Corp. (Borland is a registered trademark of Ashton Tate IBM PC, XT, AT, and PCjr are registered trademarks of International Business Machines Corp.)

CIRCLE 139 ON READER SERVICE CARD

Traveling
SIDEKICK

NOT COPY PROTECTED

137

Available at better dealers nationwide. Call (800) 556-2283 for the dealer nearest you. To order by Credit Card call (800) 255-8008. CA (800) 742-1133

Yes, I need the perfect traveling companion. Send me _____ copies

\$69.95

This price includes shipping to all U.S. cities. All foreign orders add \$10 per product ordered.

Minimum System Requirements:
128K

Yes, I need both Traveling SideKick and SideKick. I get them both for only \$125.00

Send me _____ copies

Name _____

Shipping Address _____

City _____ Zip _____

State _____

Telephone _____

60 DAY
MONEY-BACK
GUARANTEE

Subtotal _____
I.C.A. res. add \$20 tax per copy! _____
Amount Enclosed _____
Payment Visa MC BankDraft Check
Credit Card Exp Date _____
Card # _____

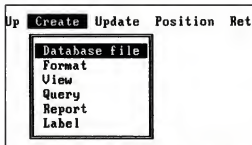
COD's and Purchase Orders WILL NOT be accepted by Borland. California residents, add 6% sales tax. Outside USA add \$10 and make payment by bank draft payable in US dollars drawn on a US bank.

Copyright 1985 Borland International B-1027

The database used now be used

Introducing dBASE III* PLUS.

The PLUS stands for all the improvements we've made to the world's number one selling database management software.



The Assistant helps beginning users accomplish day-to-day data management tasks without programming.

Mind you, dBASE III PLUS still has the powerful dBASE programming language, dot prompt, and all the features that have made dBASE III the standard of the industry.

We've simply raised the standard.

And just as dBASE III introduced more power to the people, our new dBASE III PLUS introduces more people to the power.

People who aren't all that crazy about programming, for example.

The Assistant feature in dBASE III PLUS now provides them with new easy-to-use pull-down menus for creating, using and modifying multiple databases.

So now anyone who can manage a simple cursor can manage day-to-day data management tasks. Without programming.

And by using our new Screen Painter,

anyone can create custom screens. Without programming.

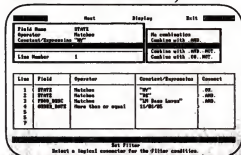
Or using View, access related information in several databases at one time. Without programming.

With Advanced Query System, another new non-programming feature, any user can build complex queries just by selecting from the dBASE III PLUS pull-down menus.

For rapidly creating entire programs, there's even a new Applications Generator.

And for all those who wish to learn to program, the Assistant can be of further assistance. By teaching you programming commands as you go along. Without disrupting your work flow.

These are only a few of the dBASE III PLUS features that can help new users quickly get up to speed. And experienced users quickly increase their speed. (Sorting, for example, is up to two times faster and indexing up to ten times faster than dBASE III.)



Advanced Query System lets you set up and answer complex queries without programming.

by more people can by more people.

And it's the fastest way to network those users, too. Because now, local area networking capabilities are built right in.

dBASE III PLUS can also help put developers in the fast lane. With a new Data Catalog and more than 50 new commands and functions. Plus code encryption and linking, improved debugging aids, assembly language calls and much more.

To obtain a free dBASE III PLUS demo disk, call 800-437-4329, Extension 0284, for the authorized Ashton-Tate® dealer nearest you.**

And get your hands on dBASE III PLUS. It's the software more people can look forward to using.

CIRCLE 236 ON READER SERVICE CARD

*In Colorado call (303) 799-4900, Extension 0284. **Upgrades are available to all dBASE III owners. Requires IBM® PC or 100% compatible. Trademarks owned by Ashton-Tate, dBASE III, Ashton-Tate, IBM/International Business Machines Corporation. © 1985 Ashton-Tate. All rights reserved.

ASHTON-TATE

dBASE III PLUS

The data management standard.





NOTHING DOWN.

Even the best of personal computers can have a bad day. Blackouts happen. Usually at the worst possible time.

But power interruptions don't need to be business interruptions. And lost power shouldn't result in lost data. Not with the POWERMAKER[®] Micro UPS from Topaz.

Designed specifically for hard disc and critical-use business systems, Powermaker Micro UPS ensures a continuous supply of smooth sine wave power even during

a total blackout.

And there's more. Powermaker Micro UPS also removes spikes and other error-producing transients from incoming power, protecting your PC's sensitive circuitry.

So, if your PC needs a little help once in a while, give it Powermaker Micro UPS protection. For nothing down. Call us today at (619) 279-0831, or contact your local Square D distributor.

TOPAZ[®]
SQUARE D COMPANY

CIRCLE 353 ON READER SERVICE CARD

Ansa Software's Paradox commands attention as a high-end database manager. Not only is it fast and easy to use, but it combines the best features of 1-2-3, dBASE, and Infoscope with its own to make one impressive program.

Y

ou need a pretty good product just to break even in the database marketplace, but some people are betting that a new high-end database management system (DBMS) called *Paradox* will do much more than just break even, despite the tough competition.

Ben Rosen, a major backer of Lotus Development Corp.'s successful start-up, has given his financial imprimatur to the fledgling Ansa Software and its flagship product, *Paradox*, in the hope that 1-2-3's formula for success will work again. Success seems likely because *Paradox*'s designers, Richard Schwartz and Robert Shostak, have intelligently recognized that the familiar sells. They have borrowed the best elements of the market leaders and combined them into a product that goes beyond the best-sellers while remaining compatible with them. Ansa is marketing *Paradox* as a "better" alternative to popular products and as an "upgrade" for 1-2-3 users who want more DBMS power and dBASE users who want a better visual interface and an expanded programming language.

Paradox borrows 1-2-3's two-line menu interface and cell format, offers a dBASE III-like structured programming language, and takes some advanced fea-

PARADOX

A DATABASE MANAGER WITH A FAMILIAR FACE

tures from Microstuf Inc.'s highly rated *Infoscope* DBMS, such as its ability to modify the size and contents of database fields using on-screen graphics. 1-2-3 and dBASE users will quickly find themselves at home with *Paradox* and will easily be able to exchange files between the new program and their old favorites.

Paradox is friendly, fast, and loaded with features. It also requires a lot of mem-

ory to run, eating RAM and disk storage space like IBM consumes Intel chips. According to its manual, *Paradox* needs 512K bytes of RAM to run, and the program will let you know right away if all that space isn't available. If you have insufficient RAM, *Paradox* will put an error message on the screen and refuse to sign on. You also have to increase the number of files and buffers reserved by the CON-

PARADOX

Sorting answer table into new table

Number (fields to sort on) (1, 2, etc.). If you want a field sorted in descending sequence, follow the number with a "D" (e.g., "1D", "2D"). Ascending is the normal sequence and need not be indicated.

Last Name
Dept No
Salary

Sorting answer table: Record 1 of 473

NAME	Last Name	Dept No	Salary
1	Adams	1	23,000.00
2	Allen	3	31,000.00
3	Alton	3	17,500.00
4	Ames	1	29,000.00
5	Ang	1	30,000.00
6	Anderson	1	27,000.00
7	Anderson	3	28,000.00
8	Anderson	3	17,000.00
9	Anderson	3	27,000.00
10	Armstrong	3	26,000.00
11	Armstrong	3	15,000.00
12	Baker	1	27,000.00
13	Baker	3	27,000.00
14	Baker	3	14,000.00
15	Baker	3	27,000.00
16	Baker	3	27,000.00
17	Baker	3	27,000.00
18	Baker	3	27,000.00
19	Baker	3	27,000.00
20	Baker	3	27,000.00
21	Baker	3	27,000.00
22	Baker	3	27,000.00
23	Baker	3	27,000.00
24	Baker	3	27,000.00
25	Baker	3	27,000.00
26	Baker	3	27,000.00
27	Baker	3	27,000.00
28	Baker	3	27,000.00
29	Baker	3	27,000.00
30	Baker	3	27,000.00

The sorting sequence table above shows how easy it is to make an inquiry of or modify a Paradox data table.

This is Paradox's response to the inquiry to sort by last name, department, and salary.

FIG.SYS command when the system boots, or Paradox won't have enough space to work. Forget about RAMdisks of any practical size. You might even find it hard to use print spoolers in RAM or RAM-resident programs waiting to take control of the screen.

You can run Paradox on a floppy-based PC, but if you want to create applications that do a lot of computations in arrays, you had better also allow a free megabyte of hard disk storage space for Paradox to write array data. It's a great excuse for upgrading your system because it gives you a lot of power in exchange for all those bytes it eats.

Paradox can do big jobs. A single data table can have up to 65,000 records, and because the program allows multiple tables, you will surely run out of data storage space before the program runs out of data-handling ability. It can do fast, informal inquiries into more than one table at once and combine the results for placement into a form on the screen or printer. You can use the formal programming language to design input screens and function menus and to write complex data inquiries resulting in formal reports.

But Paradox queries don't have to be just informal (temporary programs) or formal (permanent programs). You can quickly create permanently recorded inquiry macros tailored to a specific application that you can replay with a single keystroke anytime you need them.

1-2-3 or Multiplan users will feel familiar with the Paradox two-level horizontal menu, which uses the second line to explain the features highlighted in the top line. The cursor movement and command selection methods are the same as those in 1-2-3 and Multiplan, but you bring the

Like 1-2-3's own primitive database, Paradox's primary interface uses a spreadsheetlike format that lets you see the horizontal and vertical relationships of records and fields.

menu to the screen by touching the F10 key instead of the slash (/). The F1 (help) key brings up screens of text that follow the 1-2-3 pattern of allowing you to branch to explanations of other related subjects. Ansa has even supplied a hard plastic Paradox function-key template (similar to the one Lotus supplies with 1-2-3) that describes key assignments in the Alt and unshifted modes.

Like 1-2-3's own primitive database, Paradox's primary interface uses a spreadsheetlike format that lets you see the horizontal and vertical relationships of records

(rows) and fields (columns). Some database systems only allow you to write lines of program code in which you describe these records and fields in words. Paradox shows you the columns and rows and allows you to enter, retrieve, and manipulate data according to these horizontal and vertical relationships.

Advanced 1-2-3 users will appreciate Paradox's ability to build macros. The Alt-F3 key combination tells the program to record the keystrokes that follow. You can run through a complex sort-and-retrieval using the menu or issuing commands, and the program will capture every keystroke. Keying in Alt-F4 plays the recorded keystrokes back. A menu selection lets you attach the "recording" to a particular key combination so that you can replay it any time you need it.

Although Paradox has many features in common with 1-2-3, it's not just another 1-2-3 clone. Nor does it do all that 1-2-3 does by any means. Paradox has math functions, but it does not claim to be a spread-

PC FILE

Paradox

Ansa Software
1301 Shore Way Rd., # 221
Belmont, CA 94001
(415) 595-4469

List Price: \$695

Requires: 512K RAM, two disk drives, DOS 2.0 or later.

CIRCLE 691 ON READER SERVICE CARD

If you've told us once, you've told us a million times.

The message is loud and clear.

When dedicated number crunchers wanted a no-nonsense, straight ahead, gets-it-done spreadsheet, they chose Microsoft® Multiplan®. As of today, they've bought over a million copies.

Now the good news. Microsoft Multiplan just got better.

More room. More power. And Macros.

New MS-DOS® Multiplan 2.0 gives you the added workspace you crave. Over a million cells, if you're counting, in an expanded 255x4095 matrix.

New Multiplan's faster. Up to four times faster than first generation Multiplan. (And faster than 1-2-3® in most uses).

Yet with all its power, it's a breeze to manage. Because, like you, Multiplan works intuitively. Commands are in English, not Zulu. You work in named regions, not obscure coordinates. So you can get things done quickly, naturally.

At the keyboard. Or at the click of a mouse.

We added macro capability, too. So you can shrink those long, complex or repetitive sequences to a single keystroke.

Multiplan reads and writes 1-2-3 files in one deft command. That means you can share spreadsheets from PC to PC, nimbly, painlessly.

It's the only spreadsheet that offers linking. And true model consolidation (in batches, or one at a time). All in one command. So you can overwhelm those huge models — not vice versa.

Linking also means you won't run out of memory. Or need to add expensive hardware.

If you're looking for your basic super spreadsheet — without the super pricetag — try new Microsoft Multiplan.

A million crunchers can't be wrong.

Microsoft® Multiplan®
The High Performance Software™

For the name of your nearest Microsoft dealer, or to upgrade to Multiplan 2.0, call (800) 426-9400. In Washington State and Alaska, (206) 838-8300. In Canada, call (416) 673-7638.

Microsoft, Multiplan and MS-DOS are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. 1-2-3 is a registered trademark of Lotus Development Corporation.



BUSINESS START-UP ANALYSIS

Cash Funds Available	\$38,000.00
Owner's Funds	40,000.00
Bank Loan	\$65,000.00
Total Cash Available	\$1,250.00
Organizational & Pre-Operating Expenses	\$1,250.00
Advertising for Opening	1,250.00
Deposits-Franchise & Utilities	4,500.00
Decorating & Remodeling	2,500.00
Furniture & Equipment	275.00
Licenses & Permits	1,500.00
Professional Fees	2,525.00
Rent - 3 months security	1,500.00
Other Expenses	
Total Org'l & Pre-Operating Expenses	\$1,250.00
Cash Balance Available	\$0.00

Microsoft
Multiplan



PARADOX

sheet. *Paradox* doesn't have 1-2-3's graphics or its ability to easily create extended formulas that apply to only one cell.

Paradox goes beyond 1-2-3's database capabilities to match such full-function DBMS programs as *dBASE III*. It can work on more than one table at a time and on more data than can be held in RAM. It also has a full-featured procedural language, the *Paradox* Application Language (PAL), which has a syntax and program structure similar to that of the *dBASE* language. PAL's commands are often identical or quite similar to the corresponding *dBASE* words, but it has more of them.

If you are a *dBASE* programmer and you keep Ansa's cross-reference guide at your elbow to tell you that INPUT has become ACCEPT and LIST has become VIEW, you'll be able to start writing PAL code right away. You will probably like *Paradox*'s built-in functions, which let you check the status of a specific disk drive, find the name of the current active directory, and check the keyboard buffer for characters that might otherwise be lost. You might also find uses for the *Paradox* features that build arrays and perform trigonometric and statistical functions, including logarithm arccosine, arctangent, maximum, minimum, average, and standard deviation.

PAL has excellent functions for controlling the printer and constructing data input or report screens that take full advantage

Is Machine Reasoning Reason Enough?

Despite what the press releases claim, "machine reasoning" is not the most salient feature of *Paradox*. Its truly valuable features are more straightforward.

The press releases for Ansa Software's *Paradox* stress "machine reasoning" as a major feature of the database manager. Machine reasoning is described as an artificial intelligence technique that gives the computer the ability to figure out the best way to find the data you request.

It's true that you don't have to write a line of code or even type in a single word to formulate a complex retrieval in *Paradox*. You can do everything through menu selections and interaction with graphics displays on the screen, but this is a feature I've seen in several other database management programs, notably *InfoScope* and *PowerBase*.

Frankly, *Paradox*'s ability to respond to inputs from menus and screen displays doesn't seem any more miraculous than does 1-2-3's ability to generate graphs almost instantly from spreadsheet data.

Database management programs that have natural-language features—such as *Salvo*—can respond to a query such as "List the retail customers for salesman Baker and their orders and parts" by accessing four different data files and combining them into a nicely displayed report. This seems to be as impressive a piece of machine reasoning as the retrievals done by *Paradox*, with its on-screen check marks.

Maybe we have become jaded to miracles of programming, but the value of machine reasoning seems nebulous. The best selling points of *Paradox* are its impressive data-handling power and the integration of its features. Attention to details such as the use of color, the content and positioning of error messages, and liberal forgiveness for dumb mistakes are the features that give *Paradox* class.

—Frank J. Derfler, Jr.

of the PC's display, whether color or monochrome. It is a very complete DBMS language, but unlike other such complete languages as SQL, it's easy for someone raised on BASIC or Pascal to use.

What You See Is What You Are

Paradox's high-quality screen displays help you edit data, change the way answers to your inquiries are displayed, and actually make the inquiries. A unique image-scrolling feature also lets you see how you got to where you are and go back through the looking glass to

change what you did.

This on-screen editing is a real boon to DBMS users accustomed to programs that let you review and edit data only record by record, which is like sorting through a stack of 3- by 5-inch cards one at a time. *Paradox* lets you take a full-screen look at your database and then move around to spot errors or change data with an on-screen editor. Edited data becomes a permanent part of the database.

You can also use the screen-display command ALTER to change the configuration of the displayed tables you get as answers to data queries. If you have made a query into the database and the answer is a large display of records, *Paradox* will allow you to change fields around, alter the size of fields, and generally reconfigure the resulting table to meet your immediate needs. Unfortunately, *Paradox* will not allow you to make permanent changes to the configuration of the database through on-screen manipulation as *InfoScope* will and

Viewing Etable table Record 1 of 80

8/10/2001 10:01

Table 1	Last Name	First Name	Age	Sex	Height	Weight	Eye Color	Hair Color	Complexion	Birth Date	Birth Time	Birth Place	Marital Status	Religion	Education	Occupation	Income	Assets	Liabilities	Net Worth
1	Bitter	John	25	M	5'10"	180	Blue	Brown	Fair	1950	10:30	New York	Single	Catholic	High School	Teacher	\$12,000	\$5,000	\$7,000	
2	Smith	Jane	22	F	5'05"	120	Green	Blond	Fair	1952	08:15	Chicago	Single	Protestant	College	Nurse	\$10,000	\$3,000	\$7,000	
3	Johnson	Mike	28	M	6'00"	200	Blue	Black	Dark	1948	03:45	Los Angeles	Married	Jewish	University	Engineer	\$15,000	\$8,000	\$7,000	
4	Williams	Sarah	24	F	5'08"	130	Blue	Red	Fair	1951	06:00	San Francisco	Single	Buddhist	College	Librarian	\$9,000	\$2,000	\$7,000	
5	Davis	Robert	26	M	5'11"	170	Blue	Black	Fair	1949	09:30	Seattle	Single	Protestant	High School	Salesman	\$11,000	\$4,000	\$7,000	
6	Garcia	Patricia	23	F	5'06"	125	Green	Blond	Fair	1953	11:00	Phoenix	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
7	Miller	David	27	M	5'09"	160	Blue	Black	Fair	1947	04:15	Portland	Single	Jewish	University	Engineer	\$14,000	\$6,000	\$8,000	
8	Wilson	Linda	21	F	5'04"	115	Blue	Blond	Fair	1954	07:45	San Diego	Single	Protestant	College	Nurse	\$9,000	\$2,000	\$7,000	
9	Moore	James	29	M	6'02"	210	Blue	Black	Dark	1946	02:30	San Jose	Married	Catholic	High School	Manager	\$13,000	\$7,000	\$6,000	
10	Taylor	Emily	20	F	5'03"	110	Green	Blond	Fair	1955	05:15	San Antonio	Single	Buddhist	College	Teacher	\$8,000	\$1,000	\$7,000	
11	Anderson	Michael	24	M	5'07"	140	Blue	Black	Fair	1951	08:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
12	Thomas	Anna	26	F	5'09"	150	Blue	Black	Fair	1949	06:30	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
13	Clark	William	22	M	5'06"	135	Blue	Black	Fair	1953	09:15	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
14	White	Elizabeth	25	F	5'08"	145	Blue	Black	Fair	1950	07:00	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
15	Green	Thomas	23	M	5'07"	140	Blue	Black	Fair	1952	05:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
16	Scott	Patricia	21	F	5'05"	120	Blue	Black	Fair	1954	08:30	San Jose	Single	Catholic	College	Teacher	\$9,000	\$2,000	\$7,000	
17	Young	Robert	27	M	5'09"	160	Blue	Black	Fair	1947	04:15	San Jose	Single	Jewish	University	Engineer	\$14,000	\$6,000	\$8,000	
18	King	Linda	24	F	5'06"	125	Blue	Black	Fair	1951	06:00	San Jose	Single	Protestant	College	Nurse	\$9,000	\$2,000	\$7,000	
19	Wright	James	29	M	6'02"	210	Blue	Black	Dark	1946	02:30	San Jose	Married	Catholic	High School	Manager	\$13,000	\$7,000	\$6,000	
20	Allen	Emily	20	F	5'03"	110	Green	Blond	Fair	1955	05:15	San Jose	Single	Buddhist	College	Teacher	\$8,000	\$1,000	\$7,000	
21	Black	Michael	24	M	5'07"	140	Blue	Black	Fair	1951	08:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
22	Brown	Anna	26	F	5'09"	150	Blue	Black	Fair	1949	06:30	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
23	Clark	William	22	M	5'06"	135	Blue	Black	Fair	1953	09:15	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
24	White	Elizabeth	25	F	5'08"	145	Blue	Black	Fair	1950	07:00	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
25	Green	Thomas	23	M	5'07"	140	Blue	Black	Fair	1952	05:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
26	Scott	Patricia	21	F	5'05"	120	Blue	Black	Fair	1954	08:30	San Jose	Single	Catholic	College	Teacher	\$9,000	\$2,000	\$7,000	
27	Young	Robert	27	M	5'09"	160	Blue	Black	Fair	1947	04:15	San Jose	Single	Jewish	University	Engineer	\$14,000	\$6,000	\$8,000	
28	King	Linda	24	F	5'06"	125	Blue	Black	Fair	1951	06:00	San Jose	Single	Protestant	College	Nurse	\$9,000	\$2,000	\$7,000	
29	Wright	James	29	M	6'02"	210	Blue	Black	Dark	1946	02:30	San Jose	Married	Catholic	High School	Manager	\$13,000	\$7,000	\$6,000	
30	Allen	Emily	20	F	5'03"	110	Green	Blond	Fair	1955	05:15	San Jose	Single	Buddhist	College	Teacher	\$8,000	\$1,000	\$7,000	
31	Black	Michael	24	M	5'07"	140	Blue	Black	Fair	1951	08:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
32	Brown	Anna	26	F	5'09"	150	Blue	Black	Fair	1949	06:30	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
33	Clark	William	22	M	5'06"	135	Blue	Black	Fair	1953	09:15	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
34	White	Elizabeth	25	F	5'08"	145	Blue	Black	Fair	1950	07:00	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
35	Green	Thomas	23	M	5'07"	140	Blue	Black	Fair	1952	05:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
36	Scott	Patricia	21	F	5'05"	120	Blue	Black	Fair	1954	08:30	San Jose	Single	Catholic	College	Teacher	\$9,000	\$2,000	\$7,000	
37	Young	Robert	27	M	5'09"	160	Blue	Black	Fair	1947	04:15	San Jose	Single	Jewish	University	Engineer	\$14,000	\$6,000	\$8,000	
38	King	Linda	24	F	5'06"	125	Blue	Black	Fair	1951	06:00	San Jose	Single	Protestant	College	Nurse	\$9,000	\$2,000	\$7,000	
39	Wright	James	29	M	6'02"	210	Blue	Black	Dark	1946	02:30	San Jose	Married	Catholic	High School	Manager	\$13,000	\$7,000	\$6,000	
40	Allen	Emily	20	F	5'03"	110	Green	Blond	Fair	1955	05:15	San Jose	Single	Buddhist	College	Teacher	\$8,000	\$1,000	\$7,000	
41	Black	Michael	24	M	5'07"	140	Blue	Black	Fair	1951	08:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
42	Brown	Anna	26	F	5'09"	150	Blue	Black	Fair	1949	06:30	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
43	Clark	William	22	M	5'06"	135	Blue	Black	Fair	1953	09:15	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
44	White	Elizabeth	25	F	5'08"	145	Blue	Black	Fair	1950	07:00	San Jose	Single	Catholic	College	Teacher	\$10,000	\$3,000	\$7,000	
45	Green	Thomas	23	M	5'07"	140	Blue	Black	Fair	1952	05:45	San Jose	Single	Protestant	College	Engineer	\$11,000	\$4,000	\$7,000	
46	Scott	Patricia	21	F	5'05"	120	Blue	Black	Fair	1954	08:30	San Jose	Single	Catholic	College	Teacher	\$9,000	\$2,000	\$7,000	
47	Young	Robert	27	M	5'09"	160	Blue	Black	Fair	1947	04:15	San Jose	Single	Jewish	University	Engineer	\$14,000	\$6,000	\$8,000	
48	King	Linda	24	F	5'06"	125	Blue	Black	Fair	1951	06:00	San Jose	Single	Protestant	College	Nurse	\$9,000	\$2,000	\$7,000	
49	Wright	James	29	M	6'02"	210	Blue	Black	Dark	1946	02:30	San Jose	Married	Catholic	High School	Manager	\$13,000	\$7,000	\$6,000	
50	Allen	Emily	20	F	5'03"	110	Green	Blond	Fair	1955	05:15	San Jose	Single	Buddhist	College	Teacher	\$8,000	\$1,000	\$7,000	

Paradox can have up to 65,000 records in a single data table. The program also allows for multiple tables.

Break a leg.

When you're the one on stage, the one on the spot, it really helps to have great support.

You can, you know. With new Microsoft® Chart 2.0.

Until you've worked with Chart, you won't imagine the talents that lurk within your PC. And how easily you can unlock them to create the kaleidoscope of full blown, full color graphics only Chart can produce.

Something to really wake up the audience in your next presentation.

For best performance in a supporting role.

Only Chart gives you the freedom to do all the custom work you want. Because it gives you all the tools you need to persuade your audience and illustrate your point.

Things like line, bar, area, pie, column, high-low and scatter charts.

(Up to 16 to a page.)

Choose from 177 colors. Create legends. Do overlays. Add text anywhere, in countless type styles. Move, size, shift. The works.

Chart only gets better. Because only Chart 2.0 links directly with Lotus® 1-2-3®. As well as Microsoft Multiplan®. So when the numbers change, the charts change. Automatically. It works wonders with VisiCalc®, dBASE III®, R:BASE 5000® and a chorus of others.

Ready to roll?

So's Chart. In the presentation style that's custom-tailored to your audience. Get remarkable 35mm slides. Do dazzling overheads. Or crank out winning reports with all leading printers, laser printers and color plotters.

Check out new Microsoft Chart. You'll get boardroom quality graphics, everytime. Without the intramural, 11th hour anxieties. And without the whopping outside bills.

And that ought to earn you top billing in any meeting.

Microsoft® Chart

The High Performance Software™



For the name of your nearest Microsoft dealer or to upgrade to Chart 2.0, call (800) 426-9400. In Washington State and Alaska, (206) 828-8088. In Canada, call (416) 673-7638.

Microsoft and Multiplan are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. VisiCalc is a registered trademark of VisiCorp. dBASE III is a trademark of Ashton-Tate. R:BASE 5000 is a registered trademark of Microsoft. IBM is a registered trademark of International Business Machines Corporation.

Chart runs on IBM® PCs and compatibles. And supports IBM EGA and other graphic cards, as well as the latest output devices from Polaroid, Hewlett Packard, IBM and others.

PARADOX

Paradox: Features and Performance

Number of records per file:	limited by storage
Number of files open at once:	unlimited
Number of screens per file:	limited by storage
Number of fields per record:	225
Time to sort 500 records, two levels:	42 seconds
Field types:	text, dollar, integer, floating-point, date, time
Date math calculations:	yes
Reports	
Change column headings	yes
Multiple lines/record	yes
Calculated fields	yes
Subtotals	yes
Page break	yes
No. of levels	yes
No. of files per report	unlimited

it doesn't use color as well as *Infoscope*, but ALTER is valuable for displaying practical answers to your database queries.

The program also has an interesting screen display that will help you make informal queries. *Paradox* displays an image

of the fields available and allows you to place a check mark (created by special programming of the F6 key) in the fields holding data you want to see. You can also set conditions in the fields such as $>= 10,000$ or $= \text{Smith}$. You can put conditions on every field or just put limiting conditions on one field: $>= 100$, $<= 500$ will show you all records with amounts between 100 and 500 in that field.

This informal query procedure lets you set either-or conditions such as "live in California or drive a BMW" and have the flexibility to handle upper- and lowercase entries and other variables. The process is easy to use and fast.

Putting data into *Paradox* is a joy. *Paradox* has an excellent data import and export function that can easily and quickly handle 1-2-3, *Symphony*, *dBASE II* and *III*, *PFS:FILE*, and *DIF* (*VisiCalc* and others) and ASCII files. I created and exchanged files with 1-2-3 and *dBASE III*

PC GUARANTEES THE LATEST IBM NEWS!

You always get up-to-the-minute news and facts on IBM's fast-paced technology because *PC Magazine* is published 22 times a year! When a new product or concept is introduced—you'll get the facts—GUARANTEED!

More importantly, you receive detailed reviews on all new IBM

and compatible hardware and software, and techniques that help you use them effectively.

Discover proven, hands-on applications and innovative ideas directed toward professionals in PC's "ProColumns." Share your PC insights with other users in "User to User." And, get help on specific com-

puting problems in "PC Tutor."

Order *PC Magazine* today and save up to 50%! Two years just \$34.97. Or, if you prefer, one year (22 issues) for \$21.97. Just complete and mail the coupon below!

or CALL TOLL FREE
1-800-852-5200!



Mail to: **PC Magazine**
P.O. Box 2443 • Boulder, Colorado 80322

82A10

YES!

Please enter my subscription to *PC Magazine* for:

☐ Two years (44 issues) for \$34.97. I save 50%!

☐ One year (22 issues) for \$21.97. I save 37%!

☐ Payment enclosed

☐ Bill me later

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Please allow up to 60 days for delivery of first issue. Add \$15 outside USA. US currency only. Savings based on basic one-year (22 issue) subscription rate of \$34.97.

with no problems. Importing the PC Magazine Labs test files took only a few minutes. *Paradox* even found the two records with incorrectly formatted data and presented them for correction.

Unlike the frustration of report writing in many other DBMS languages, *Paradox*'s easy information retrieval was a pleasure. After a few retrievals for training, I could select four or five fields from three data files and have them correlated, sorted, and displayed in less than 2 minutes.

To produce reports summarizing or manipulating data drawn from several files, I used a *Paradox* menu selection called Report. The Report function displays the form on the screen and allows you to insert and write the specifications for new fields as quickly as you could in a spreadsheet. It takes about 2 minutes to make the request and less than a minute for it to appear on the screen.

I performed all the PC Magazine Labs benchmarks using *Paradox*'s menus and special function keys—I didn't have to use PAL for any of these retrievals or reports. I am convinced that even an expert *dBASE* programmer could not have created the application more quickly in code than I did on the screen. However, anyone using PAL would be able to do more complex mathematical functions and format printed reports better in code than I could on the screen. Programmers could also create better security protection for files and screens that make better use of color.


Copy Protection

Ansa's copy-protection scheme gives you a choice between flexibility and ease of use. If you run an installation routine, you can put *Paradox* on your hard disk and not have to keep a program disk in drive A: for verification when you want to fire up the program. If you install the program,

you will have to uninstall it before you can move it over to another machine. (The data files you create are portable.) But if you want more flexibility, you can just move the program files over to the hard disk and keep the original disk in drive A: for verification when *Paradox* signs on. In this way, you can have one copy of the program that you can run at home or in the office—but not in both places at once.


Paradox's excellent manuals include clear illustrations of the screen and keyboard and references to other related topics. I particularly like the two slim volumes of special information included for 1-2-3 and *dBASE* users. Armed with the appropriate volume, anyone familiar with either of these programs can be effectively using *Paradox* in minutes.

I was able to do complex work with *Paradox* minutes after I inserted the first disk, but after spending 7 full days working with the program, I was still finding



PICK A ROSE

ACCOUNTING SOFTWARE



**"A Complete Accounting System
For Your Specific Industry"**

- FOR CP/MS DOS & PC DOS MACHINES
- COMPLETE ACCOUNTING VS. JUST SOFTWARE
- OVER 100 PROGRAMS IN EACH PACKAGE
- FREE SUPPORT

\$49.95

TO ORDER CALL:
(IN PA) 1-800-551-ROSE
(OUT OF PA) 1-800-553-ROSE
FOR MORE INFO. 215-443-7028

GENERAL SYSTEM	CONSTRUCTION	RETAIL SALES	EQUIPMENT RENTAL
INVOICING ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY ORDER ENTRY PURCHASE ORDER GENERAL LEDGER \$49.95	JOB COST ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY ORDER ENTRY BID PREPARATION GENERAL LEDGER \$49.95	DROP SHIP PURCHASES ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY ORDER ENTRY MAIL LIST MGMT GENERAL LEDGER \$49.95	RENTAL BILLING ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY 3RD PARTY BILLING MAIL LIST MGMT GENERAL LEDGER \$49.95

PROFESSIONAL	MANUFACTURING	WHOLESALE SALES	MEDICAL BILLING
TIME BILLING ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY ORDER ENTRY MAIL LIST MGMT GENERAL LEDGER \$49.95	JOB TRACKING ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY ORDER ENTRY BID PREPARATION GENERAL LEDGER \$49.95	DROP SHIP PURCHASES ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL ORDER ENTRY MAIL LIST MGMT GENERAL LEDGER INVENTORY \$49.95	3RD PARTY BILLING ACCTS RECEIVABLE ACCTS PAYABLE PAYROLL INVENTORY MAIL LIST MGMT PATIENT HISTORY GENERAL LEDGER \$49.95

ROSE ASSOCIATES
2005 FAIR OAKS AVE.
HATBORO, PA 19040

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MONEY ORDER _____

VISA _____ MC _____ EXP. DATE _____

CARD # _____

COMPUTER TYPE _____

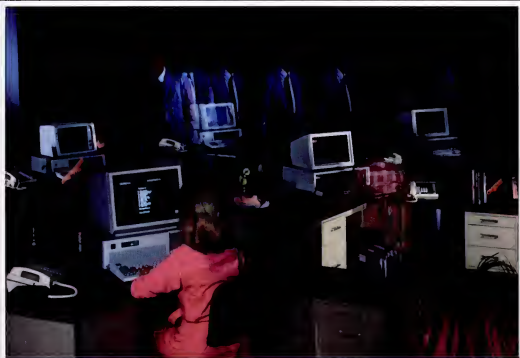
DISK TYPE _____

SYSTEM DESIRED _____

INCL. \$1.50 FOR POSTAGE & HANDLING
 PA RESIDENCE ADDN. SALES TAX
 FOR MORE INFO. CALL 215-443-7028

CIRCLE 115 ON READER SERVICE CARD

The Transporter Night Shift



Long After Your Staff Goes Home, We Keep Your PC Making Calls, Sending and Receiving Files, and Keeping a Log

Your microcomputer doesn't go home at five. Why not keep it working?

TRANSPORTER keeps your PC communicating almost as well as your staff could do it. Just load it with a "task list" before you go home. It can automatically call other computers, log in, repeat calls if necessary, send and receive files, and more.

It can do it overnight, when phone rates are lowest.

The next morning, TRANSPORTER gives you a report of what it has accomplished during its night shift.

So you can start the day ahead of the game.

TRANSPORTER comes with our popular CROSSTALK data communications program added on. It communicates with any other system running TRANSPORTER or CROSSTALK. For details, see your retailer or write for a brochure.

CIRCLE 326 ON READER SERVICE CARD
1000 Holcomb Woods Parkway
Roswell, Georgia 30076

MICROSTUFF

For the IBM Personal Computer. Requires 128K RAM, two disk drives, PC DOS, Asynchronous Communications interface or equivalent RS232 connection, and a modem compatible with the AT command set.

TRANSPORTER

PARADOX

important features. *Paradox* is obviously the result of years of effort. It shows the signs of true class in the way it smoothly handles errors (polite English prompts) and quietly keeps files of changed data so that you can recover from dumb mistakes.

To qualify as a Category 4 database under *PC Magazine's* classification scheme, a DBMS must have a method of doing informal queries with Boolean conditions, such as IF, THEN, or ELSE, and it must also have a procedural language. The procedural language must contain structures such as loops and GOTO statements and enable the programmer to build applications that nonprogrammers can use interactively to enter and maintain database files. *Paradox* meets these criteria.

Category 4 products must also in some way set a standard in microcomputer database design. *Paradox* meets this test through its provisions for on-screen visual interaction with the database and its attempts at compatibility with widely used programs from other companies.

Other members of Category 4 include *dBASE III*, *KnowledgeMan*, *PowerBase*, and *INFORMIX*. On the whole, *Paradox* can match or exceed the performance and features of any of these programs. It does, however, lack the natural-language features of *KnowledgeMan*, *INFORMIX*, and some other Category 4 programs that let these programs parse phrases entered in ordinary English looking for important discriminating words while ignoring unimportant articles and adjectives. *Paradox* substitutes an efficient visual checklist for typed queries and neatly sidesteps the need for natural-language recognition.

Paradox is impressive on the surface, and the deeper you go, the more the feeling grows. It is fast, capable, easy to learn and use, and well documented. It also costs a steep \$695 and takes a fully stuffed PC to run. This price (the same as *dBASE III's*) shows that *Paradox* is aimed at Ashton-Tate's heart. Even at those prices, neither product is perfect for every application, but *Paradox* is easy to use and offers high-end programming power that should attract the attention of many corporate, government, and institutional buyers.

Frank J. Derfler, Jr., is a contributing editor of *PC Magazine*.

COMPUTERS

ATAT 5300 256K, 2 Dr. Mono	\$1079
640K, 10 MB Mono	\$2399
HEWlett-Packard 7000 Portable	\$1399
COMPAQ	
PC-400 22 W Monitor (2DR)	\$1329
PPC-400 32 (2 DR PORT)	\$1239
ALTO 886-25	\$6297
2086-2	\$15,799



IBM

PC 256K, 2 Dr.	\$1649
PC 256K, 1 Dr. 10 MB	\$2149
PC 256K, 1 Dr. 10 MB, 10 MB Tape	\$2790
PC 256K, 1 Dr. 20 MB, 10 MB Tape	\$2889
XT 256K, 1 Dr. 10 MB, 10 MB Tape	\$2889
XT 256K, 1 Dr. 30 MB, 60 MB Tape	\$3009
At 512K, 1 Dr. 20 MB, 60 MB Tape	\$4799
At 512K, 1 Dr. 60 MB, 60 MB Tape	\$5099

ITT XTRA	
XTRA-XP III 512K, 10 MB	\$3125
XTRA-2 256K, 2 Dr.	\$1225
XTRA-3 256K, 10 MB	\$1705

NEC	
PC Model 1014, 20MB	\$2799
PC Enhanced, 20MB	\$3699

NEC APC II	
H102M Mono 2 Dr.	\$1409
H102M Mono 2 Dr.	

Wordstar Pro, Ext 260	\$2050
H121C 1 Dr. 20 MB, Color	\$2799
H121C w/AUTOCAD ADE3	\$4699

PARADOX	
Sr Partner 256K, 2 Dr.	\$1899
Bt Partner 256K, 1 Dr. 10 MB	\$2099
Executive Partner	\$1995

WANG	
PC-PK2 2 Dr. IBM Emulation	\$2484
PC-PK2 1 Dr. 10 MB, 10 MB Emu	\$2339
WDA 4012K, w/PWAD15	\$2735
APC 6028, 512K, 1.2 MB Dr	\$2850

ZENITH	
ZF-140-42 w/zvcm123	\$1195
ZF-241-81	\$2899
ZF-154-52	\$1750

PRINTERS	
C. ITCM AI Models	\$C41
PROTECTOR 1200/8	
041-151/153-35	\$359/729

EPSON	
FX-85	\$545
FX-105	\$879
FX-80 Laser	\$409
FX-80 Laser	\$409
NEWLETT-PACKAGE Laser Jet	\$2400

NEC	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PARADOX	
ML-103	\$219
ML-102	\$189
ML-101	\$189

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

PC-P23	
PC-P23	\$499/715
ELF 350	\$399
ORIENTA	\$1050

GenTech

HARD DISKS & TAPE BACKUP

INTERNAL HARD DISK KITS FOR PC/XT

PRISM 512K/72MB	\$1449/1845
SEAGATE, TANDOR	
10-20 30MB	\$429 529 999

INTERNAL HARD DISK KITS FOR IBM AT

PRISM (30 MB)	
BT172 MB	\$1249/1445
SEAGATE 145 MB	
TANDOR 30 MB	\$879

CONVUS AI Models	\$C41
10MB4 Datacube Dec	\$C41
IRWIN Tape Backup Systems	
Internal 10 MB/20 MB	\$499/799
External 10 MB/20 MB	\$599/899
TALIBASE 10/20/30	\$2799
TG-4000 Backup	\$1599

PLOTTERS & DIGITIZERS

CALCOMP 10431	\$7959
INTER COMPUTING 3x Shoulder	\$1759
ADJUSTON INSTRUMENTS	
PC-485	\$645
DMP-4V-42	\$2269
DMP-25	\$1799
DMP-5V-52	\$2550



DOLAND	
OXY-100	\$439
OXY-400	\$879
OXY-800	\$2899
OXY-500	\$1159
ETEC AI Models	\$C41
ETEC AI Model 7	\$699
ETEC AI Model 7	\$699
TALAN 7355	\$879

MONITORS & TERMINALS

AMNEX	
Video 200/300/400/500	\$125/130/155
Color 500/710	\$270/450
MITSUBISHI AI Models	\$C41
MITSUBISHI AI Models	\$C41
MAX 12E	\$1719
MAX 12E-12E-12E-12E	\$489/519/539
NEULAND	
MD-125A-1	\$109
MD-125B-1	\$129
MD-125C-1	\$149
TALAN 7355	\$879
WYSE	
WY-30WY-50-WY-75	\$319/459/579
ZENITH ZVM-1220V-1230	\$89
QUAME 1015	\$529

COMMUNICATIONS & NETWORK

NAVTEC	
Smartmodem 1200/2400	\$369 599
1200/2400 w/Smartmodem	\$550
PROTECTOR Smartmodem Plus Ext	\$319
NEWTECH POPCOM 1200/100	\$249/269
PROTECTOR Promodem 1200	\$315
NOVELL Networking	\$C41
DOS Networking	\$C41

SOFTWARE

ASHTON-TATE DBASE III	\$369
Framework	\$369
HARTMAN Task Project Manager	\$259
MICROPS Word Processor Prolog	\$259
MICROSOFT Word	\$225
MULTIMASTER	\$225
IBM WordPerfect 4.1	\$225
WYSE Writer/Plan/Graph	\$85

GENTECH STANDARD

384K Multifunction Board OK	\$159
Hercules compatible video card	\$149
Standard Floppy Controller w/Cable	\$75
Standard ASYNC/CLK	\$79

HARDWARE

ABT Six Pack Plus 64K	\$219
Advantage 128K	\$415
RAMAGE	\$369
EVEREX Edge	\$C41
HERCULES Graphics Card	\$199
Color Card	\$155



INTEL Above Board	\$299
PARADOX 5-Pak	\$175
DWCHD PC-TURBO 166 w/64K	\$655

SEABARD	
Expanded Dashboard 54K	\$105
Microstar Par/PK 10K	\$139
Microstar S/S, S/P, P/S, B/C	\$139
SCMA DESIGN Color 400	\$469
Color 400 w/400K	\$565
TEGMA Graphics Master	\$489
TALL TREE JRAM-3, 256K	\$C41
MEMORY UPGRADE 1-8	\$10-
64K Set	\$C41
128K Set	\$539
256K Set	\$849
NOV-8	\$129
NOV-2	\$139
NOV-7	\$199

ACCESSORIES

SURGE PROTECTORS	
CURTIS Diamond	\$33
Computer Weather/Plus	\$39/55
KENSHION Masterpiece	\$85
COMPUTER ACCESSORIES	\$C41

EMERGENCY POWER SYSTEMS

RAIDSHIELD PC-200	\$315
SOLA Mini UPS 400	\$399
TAPPETITE BC-425-FC	\$399
DATAPACE Switchbox 2 way	\$49

DISKETTES

JAM	\$39/50
MARILL	\$29/30
SONY	\$17/50
OLYMPIA	\$17/50
OLYMPIA	\$17/50
OLYMPIA	\$17/50

CUSTOMER SERVICE

401-781-0020

ORDERS ONLY

800-843-4302

217 Broadway, Suite 915, NY, NY 10007
Hours 9-5 EST, Monday-Saturday
VISA, MasterCard, AMEX accepted.
All returned non-defective merchandise are subject to a 25% restocking charge.
GenTech reserves the right to change advertised prices.

en you can fly?

mouse moves into a one mouse-click operation.

We supply a roster of pre-programmed menus for such programs as WordStar, 1-2-3, Multiplan and VisiCalc. And it's a simple matter to customize your own menus for other programs.

Fine points of the Microsoft Mouse.

Having been left to our own devices for several years now, we have raised them to a high degree of perfection.

Some evidence of excellence: Our new Microsoft Mouse delivers twice the resolution of most other mice—200 points per inch. An aid to faster, smoother, more precise pointing. All of which can be accomplished with just the merest movement of your wrist. And on any reasonable desk surface.

We've also engineered a new body. With wrap-around command buttons designed to fit naturally in the palm of

any size hand. Details which may sound a bit dull. But the benefits are very practical.

Take it for a test flight.

We're not suggesting you throw your keyboard overboard. But we are inviting you to try out our new Mouse at your Microsoft dealer. To see how effectively it can accelerate your personal computer operations.

From then on, you can wing it.

Microsoft

The High Performance Software™

Microsoft Mouse also comes with
Microsoft Nonspool PC Paintbrush™ and Protractor Programs

For the name of your nearest Microsoft dealer, call (800) 426-9400. In Washington State and Alaska, (206) 828-8088. In Canada, call (416) 673-7638.



Microsoft and Multiplan are registered trademarks and The High Performance Software is a trademark of Microsoft Corporation. Lotus and 1-2-3 are registered trademarks of Lotus Development Corporation. WordStar is a registered trademark of MicroSoft International Corporation. Multiplan is a registered trademark of Multiplan International. DisplayWrite is a registered trademark of International Business Machines Corporation. VisiCalc is a registered trademark of Visi Corp. PC Paintbrush is a trademark of E. Soft.



THE COPY- PROTECTION WARS

Software vendors and end users battle over the right to make money versus the right to make backups. Both sides possess powerful arsenals.

Quietly but constantly, the war rages between those who protect software and those who copy it. It's a fascinating struggle of brains and imagination, with each side in business to outwit the other. Like a miniature arms race, each new weapon quickly gives rise to another, and countermeasures are foiled with counter-countermeasures. Lately there's been escalation as both sides roll out hardware in a fight that until now has mostly been fought with a software arsenal.

The struggle for data security rages on the same battlefield. As personal computer use spreads, more and more users need to protect sensitive data. Here, the first round has clearly gone to the protectors. Even inexpensive data-protection programs use exotic encryption methods that may be foolproof. In just a few seconds, you can scramble a file so thoroughly that not even the C.I.A. can read it. However, the real threat to your data can come from unexpected sources.

The problem of unauthorized copying is especially serious for the microcomputer industry for two reasons. First, software

and data can be extremely valuable. Second, anyone with a computer can make perfect copies of originals. Record companies would have the same problem if records cost hundreds of dollars and anyone with a record player could make a perfect copy for next to nothing.

Software copying is such a temptation that, if we're to believe the software industry, nearly everyone is doing it. According to a survey done in January by Future Computing, one pirated copy of business software is in use for every legitimate copy. If you make the conservative assumption that one in four pirate users would have bought the program if unable to copy it, then last year the software industry lost \$600 million to piracy. No wonder vendors protect their programs.

Two Kinds of Protection

There are two ways to protect a computer program—with hardware or software. Classic software-based protection itself has two parts. The first element is a magnetic pattern or "fingerprint" in one spot on each original copy of a program disk. The second part is a small check pro-

COPY PROTECTION

gram that looks for this fingerprint. When you try to start the protected program, the check routine runs first. If it finds the fingerprint, it figures the disk is an original and loads the application program.

What happens when you use DOS to copy a protected disk? Everything will copy perfectly except for the fingerprint. When you try to run the program, the check routine won't find the fingerprint and therefore won't run the application program. The copy protection is thus based on the fact that the NEC disk con-

troller used in the IBM PC can recognize the odd magnetic pattern of a fingerprint on the original disk but can't reproduce it on a copy.

How is it that a system that normally makes perfect copies can read things it can't write? Rick Landuyt, president of a copy-protection company called Glenco Engineering, explains: "Electronically speaking, reading and writing are entirely different. They're separate circuits, just as your eyes and ears are separate circuits. You can see the color red, but you can't

hear it. In the same way, the PC reads things it can't write." In effect, the fingerprint on a protected disk is a disk error. It's useful for DOS to be able to detect errors, but there's no reason for it to replicate them.

Companies that make protection schemes have invented many different kinds of fingerprints. The IBM PC formats a blank disk so that it writes data in separate tracks. Each track is divided into eight or nine sectors (depending on the version of DOS) with 512 bytes per sector. A typi-

PC FACT FILE



Personal Copier
Disk-Tech
P.O. Box 162
Waukegan, IL 60085
(312) 365-2803
List Price: \$39.95
Requires: 128K RAM.

CIRCLE 672 ON READER SERVICE CARD

SuperKey

Borland International Inc.
4585 Scotts Valley Dr.
Scotts Valley, CA 95066
(408) 438-8400
List Price: \$69.95 without copy protection
Requires: 128K RAM, one disk drive, DOS 2.0 or later.

CIRCLE 664 ON READER SERVICE CARD

Copy II Option Board

Central Point Software
9700 SW Capitol Hwy., #100
Portland, OR 97219
(503) 244-5782
List Price: \$95 plus \$3 shipping charge
Requires: 128K RAM, one 300K drive.

CIRCLE 669 ON READER SERVICE CARD

FILELOK

Vault Corp.
2649 Townsgate Rd., #500
Westlake Village, CA 91361
(800) 445-0193 (800) 821-8638 (in Calif.)
List Price: 2-pak (two diskettes) \$16.65
Requires: 128K RAM.

CIRCLE 668 ON READER SERVICE CARD

PROLOK

Vault Corp.
2649 Townsgate Rd., #500
Westlake Village, CA 91361
(805) 496-6602 (800) 445-0193
List Price: 2-pak (two diskettes) \$17.40
Requires: 128K RAM.

CIRCLE 667 ON READER SERVICE CARD



Copy Write
Quaid Software Ltd.
45 Charles St. E., 3d Fl.
Toronto, Ontario
CD M4Y 1S2
(416) 961-8243
List Price: \$50
Requires: 256K RAM.

CIRCLE 671 ON READER SERVICE CARD



Copy II PC
Central Point Software
9700 SW Capitol Hwy., #100
Portland, OR 97219
(503) 244-5782
List Price: \$39.95 plus \$3 shipping charge
Requires: 64K RAM.

CIRCLE 670 ON READER SERVICE CARD

Privacy Plus

United Software Security Inc.
8133 Leesburg Pike
Vienna, VA 22180
(703) 556-0007
List Price: perpetual corporate license (unlimited number of machines and sites) \$146.25. Perpetual site license (one site) \$48.75
Requires: 64K RAM

CIRCLE 663 ON READER SERVICE CARD



Locksmith PC
Alpha Logic Business Systems
4119 N. Union
Woodstock, IL 60098
(815) 568-5166
List Price: \$79.95
Requires: 192K RAM; IBM PC, XT, or compatibles.

CIRCLE 669 ON READER SERVICE CARD

ENC-300, ENC-304, ENC-305, ENC-306
Jones Futures Inc.
3079 Kilgore Rd.
Rancho Cordova, CA 95670
(916) 635-3972
List Price: ENC-300, \$245; ENC-304, \$595;
ENC-305, \$995; ENC-306, \$895
Requires: 128K RAM, MS-DOS 3.1 or earlier.

CIRCLE 662 ON READER SERVICE CARD

MagLock

Flinder Software Laboratories
169 Burnside
Tanzwanda, NY 14150
(716) 693-0584
List Price: \$89 plus \$5 shipping and handling
Requires: 128K RAM, PC-DOS 2.0 or later.

CIRCLE 661 ON READER SERVICE CARD



Disk Mechanic
MLI Microsystems
P.O. Box 825
Framingham, MA 01701
(617) 926-2055
List Price: \$70
Requires: 192K RAM on PC or XT, 256K RAM on AT, and 320K RAM on COMPAQ.

CIRCLE 660 ON READER SERVICE CARD

Knight Data Security Manager

AST Research Inc.
2121 Altun Ave.
Irvine, CA 92714
(714) 863-1333
List Price: \$295
Requires: 128K RAM, hard disk drive, DOS 2.0 or later.

CIRCLE 665 ON READER SERVICE CARD

The Access Key

Gordian Systems Inc.
3512 W. Bayshore Rd.
Palo Alto, CA 94303
(415) 494-8414
List Price: \$30

CIRCLE 666 ON READER SERVICE CARD

cal fingerprint might be a track made up of a peculiar number of sectors or a series of sectors that are an odd size. One of the most common schemes is to physically overlay a series of sectors. Another is to give a sector a strange ID.

Another fingerprinting technique uses weak bits. These bits are of unstable data that have a different value every time they're read. In a copy-protection scheme, the program reads the weak bits several times in a row. If the program gets different values for the data, it knows the data is weak and that the disk is an original. A DOS DISKCOPY command doesn't produce weak bits; it writes permanent values in the sector that was supposed to be weak. Thus, if the check routine finds strong bits that return the same value every time they are read, it knows the disk is a copy and will refuse to load.

Some fingerprints are harder to produce than others. A standard PC can actually be made to write simple fingerprints if you use special software to drive the disk controller. Both Glenco Engineering and another well-known copy-protection company, Softguard Systems Inc., sell kits that turn a PC into a copy-protection machine. Strictly through software, they make the disk controller write oddball tracks that DOS normally doesn't allow. Disks with these fingerprints can't be copied using standard DOS utilities.

However, anything that the PC can be made to write with special software, it can be made to copy with special software. Such low-level protection schemes are easily defeated by the many good copying programs that are now available. Disk-Tech, Quaid Software, and Central Point Software all make copy programs that act like the kits sold by the copy protectors (see sidebar, "The Master Copiers"). They analyze the original disk's fingerprint and tell the disk controller to copy it. What software can do, other software can undo.

The copy-protection companies have fought back by using special machines that lay down tracks that the PC's disk controller can read but can't possibly be made to copy. This is, of course, more of a bother for the software producer because it can't duplicate this protection system itself. It must either buy specially formatted disks

The Right to Bill

If users have the right to make free, painless backups and software companies have the right to be paid for the fruits of their labor, whose right comes first?

Copy protection is a thorny issue. It's at the heart of a clear conflict between the right of software vendors to guard against piracy and the right of legitimate users to make backup copies. On the basic issues the law is clear: You can't make copies of commercial software to sell or give away, but you can make archival copies. Enough people want to make copies—for whatever reason—to make a good market for companies that sell copy-busting programs.

The rest of the software industry thinks these companies sail under the skull and crossbones. And no doubt some people buy copying software so they won't have to buy anything else. However, the vendors of copying software take a strong public stand against piracy. Central Point, for example, includes ADAPSO's "Thou Shalt Not Dupe" brochure along with its *Copy II PC*.

Mike Brown, Central Point's president, thinks the solution is education. "The computer is too new," he says. "People just don't know it's wrong to steal software." He also argues that if software vendors gave good value for money and were good to their customers, there'd be no need for copy protection.

Brown cites his own products. Most distributors won't carry them for fear of offending other software vendors. That makes *Copy II PC* hard to find. It's also unprotected. This combination is a great incentive to piracy, but Brown says it's not a problem. He keeps his prices low, supports his customers, and issues frequent updates. "We give the customer a

reason to like us and to continue to do business with us," he says. "When you do that, you don't need copy protection."

Although Brown's business depends on copy protection, he would like to see it go away. His company is a member of ADAPSO and of the Software Publishers Association, where he preaches his brand of customer service.

W. Krag Brotby, chairman of copy-protection maker Vault, is less sanguine about customer honesty. "As the density of micros becomes greater, the opportunity for software theft increases," he says. Brotby agrees that protection is a nuisance, but he thinks it's necessary. "We've all gotten used to the car lock," he says, "although it's an impediment to using a car."

He also points out that software lets people do in hours what might have taken days or weeks without it. Hunting for a key disk or waiting a few seconds for a protection check is a small price to pay. "Maybe we're looking for too much instant gratification," he says.

Joe Diodati of Softguard makes a living selling copy protection, but he's no evangelist for it. He sees it as an unfortunate necessity with no inherent value. "What utility have we [copy protectors and copy busters] added to the world?" he asks. "All we've done is add to entropy—nobody really gets anything out of it." Ultimately, he too would probably like to see copy protection go away. "Education," says Diodati, "is more important than technology."

—Jared Taylor

from the protection company or get the protection company to do the duplicating.

Even so, protection may not be perfect, since the copy-busting program may not have to make a perfect copy of the fingerprint. Kevin Larsen, sales manager of Disk-Tech, which produces *Personal*

Copier, gives the example of a copy-protection scheme that might write 101 sectors to the fingerprint track instead of the usual 8 or 9. Even with special software, the NEC controller can't write a track with 101 sectors. However, as Larsen explains, when the protection routine checks the fin-

HERE'S THE BIGGEST REASON TO DUMP YOUR OLD PRINTER.

アル

That's pronounced "Alps."

As in Alps Electric Co., Ltd., the Japanese company that manufactures the new Alps P2000™ Dot Matrix Printer. Which happens to be the perfect PC printer for companies who've outgrown their old ones.

Fine. But who's Alps Electric?
And what difference does it make?



Alps Electric is an International Fortune 500 company. A \$1.5 billion manufacturer of computer and electronic products.

A company that has been making computer printers for a decade and selling them in countries throughout the world. Including this country (under the brand names of major computer manufacturers).

パス

What's more, Alps Electric is the parent company of Alps America, the company that sells, services and supports Alps printers in America.

And the difference all that makes is this.

Whether you're buying one printer or a thousand, you really ought to buy them from a solid, experienced company you can depend on.

Which is exactly what we are.

Alps. Now that you know how to say it, perhaps you'd like to dial it. (800) 828-ALPS. In California, call (800) 257-7872.

We'll give you all the reasons the Alps P2000 should be your next PC printer. And we'll give you a brochure about it.

One written in plain English.

ALPS
AMERICA

COPY PROTECTION

gerprint, all it can actually look for is the address of the 101st sector rather than count all 101 to be sure they're there.

To defeat such a scheme, all you have to do is write an address for sector 101 rather than format 101 physical sectors. This the NEC controller card can do. The fingerprint check will then find what it's looking for and be fooled into loading the program.

Getting Tough

It didn't take the protection companies long to get wise to this trick. Now they make programs that run a thorough check for a fingerprint that the PC itself can't possibly write. But still, the copiers can beat them. *Copy Write*, by Quaid Software, has a utility that doesn't even try to copy an ornerly fingerprint. Instead, it puts a *description* of the fingerprint on the new disk rather than the real thing. Before you run the copy, you first load a small, memory-resident Quaid utility. At run time, the utility interrupts the protection-checking routine, reads the description of the uncopiable fingerprint from the new disk, and tells the check routine, "Here's what you're looking for." The protection program thinks it's found the real thing and loads the program.

Yet another software-based protection scheme starts with a scrambled, unusable version of the program on disk. As usual, the protection routine first looks for a fingerprint. Part of the fingerprint is a key that unscrambles the program after it's already in memory. Only then will it run.

Bob McQuaid, president of Quaid Software, explains that even if it isn't possible to copy the fingerprint and key perfectly, there's a way to defeat this scheme. A clever utility can capture the protected program after it's been unscrambled and write it out to disk. The unscrambled program can then be copied with no trouble. "We have not found anything that we cannot copy," says McQuaid.

However, as software protection schemes proliferate, it gets harder to design a single program to beat them all. The copy busters have neatly solved the problem with hardware. Central Point and Disk-Tech have both introduced add-on boards for the PC that make perfect magnetic copies of any disk. Central Point's

board costs \$95 and is cabled to both the disk controller and the drive. When Central Point software is running, the board takes over from the controller. Since it has none of the write limitations of the NEC disk controller, it can copy anything. As Central Point president Michael Brown explains, "It just picks up the data from one disk, puts it down on another and says, 'Next sector, please.'"

Joe Diodati, Softguard's vice president for marketing and sales, takes a dim view

PROLOK burns tiny holes in the protected disk with a laser. This branding makes a physical fingerprint that even the new copy boards can't reproduce.

of the new boards. "We've been pretty good at being a moving target," he says, "but this is an escalation in the war." Diodati says his company is not planning a hardware counterattack but is trying to find a software technique to outwit the copying boards. Even so, he is generous to the competition. "You've got to give Central Point a hell of a lot of credit," he says. "What they have done is produce a cheap duplication system—it's a nice piece of equipment."

On the Hard Disk Front

As the floppy disk battle rages, another front has opened up on hard disks. More and more software is designed to run on a hard disk, but that poses a different kind of protection problem. So far, many vendors have taken the key-disk approach. You can copy the protected program onto as many hard disks as you like, but in order to run it, you have to put the original floppy in the A: drive. When the program runs from the hard disk, it checks for the fingerprint just as if it were running from the floppy.

Since some of the most popular programs (*1-2-3*, *Framework*, *Symphony*, *dBASE III*) use this technique, there is incentive to defeat it. The most common method is to use a small, memory-resident

utility that sits and waits for the protection routine to hunt for the disk in drive A: The utility ambushes the query, tells it that all is well in drive A: and sends it home. The check thinks it's done its job and runs the program.

Quaid and Nostradamus Inc. both sell memory-resident programs that defeat the key-disk check for some popular programs. Central Point's *Copy II PC* includes a similar utility at no extra charge.

Lately, the hard disk battle has taken a new turn, since legitimate users are tired of key disks. The protection companies have responded with a way to install protected programs so that they run without a key disk while remaining protected. Such programs come with an installation utility that counts how many times you put the program on a hard disk. Two or three shots is all you get. However, since you might decide to move the program to a different hard disk, there's usually an "uninstall" routine to remove the program. Each time you uninstall, you get another chance to reinstall onto a different hard disk.

This technique could work well for site licenses. A large company that wants 500 copies of a program could strike a deal with a software company for a custom-made floppy disk that allowed 500 hard disk installations instead of the usual 2. The deal could include a fat discount on the cost per copy.

Hard disk installation uses the old fingerprint technique. However, since the fingerprint has to be on each user's hard disk, each PC has got to write it. As I discussed earlier, any fingerprint a PC can be made to write on a floppy it can be made to copy—with special software. This sounds like a copy-buster's dream. It's not. Each hard disk fingerprint includes information about the unique physical characteristics of the disk.

As it happens, hard disks are rarely, if ever, identical. Each has a different number of bad tracks in different locations. Thus, if the fingerprint contains this information, even using DISKCOPY to duplicate the contents of one hard disk on another will not make a good copy. The fingerprint on the second disk won't match its physical characteristics and the program won't run.

One way around this, of course, is to

make faithful magnetic copies of the program disk before you use it to install to a hard disk. Then you could use up all the installations on the original disk and still have live copies that will also install. The battle of wits goes on.

The Hardware Wars

Physical copy-protection schemes are a different matter. Of these, the best known is certainly *PROLOK* by Vault Corp. *PROLOK* works by burning one or two tiny holes in the protected disk with a laser. This branding makes a physical fingerprint that even the new copy boards can't reproduce. If the check routine doesn't find the little holes, the program won't run.

This hole scheme sounds like bullet-proof protection, but it's not. Quaid Software took advantage of the fact that *PROLOK* was making a series of checks for the laser burn rather than a single pass. During one of those checks, a Quaid program fooled *PROLOK* into thinking it had found the burn. Vault has taken Quaid Software to court for breaking its protection scheme.

Vault chairman W. Krag Brotby says he knows of no copy program that can defeat the latest version of *PROLOK*. He says the company puts out a new version "roughly every quarter" to take advantage of new releases of DOS and to keep ahead of the copy busters.

Vault also sells a product called *FILELOK* that protects data as well as programs. It comes on fingerprinted disks that are blank except for the check routine. Any data you put on that disk can't be copied. This is a good solution for defense contractors, for example, that routinely deal with sensitive information. For added security, *FILELOK* comes with an option that encrypts the data to make it unreadable as well as uncopyable.

Vault was in the news about a year ago on account of a punitive protection scheme that became known as "Killer *PROLOK*." Brotby says that Vault developed the infamous scheme at the request of its customers. Many of them had gotten tired of seeing their software pirated in huge quantities, especially overseas. In Mexico, for example, as many as 200 illegally made copies may exist for every legitimate piece of business software. In Singapore and Hong Kong, there are stores that open-

ly sell cheap, pirated programs.

Killer *Prolok*, which Vault never planned to sell in the U.S., was going to teach pirates a lesson. If it couldn't find the laser holes on a bogus copy, it would wipe out data. If the disk were write-protected, Killer *Prolok* would wait and bash the next disk. Vault never released the product overseas either, but the very idea scared a lot of people.

The ADAPSO Key

Another physical software-protection technique is the ADAPSO key. ADAPSO, which is headquartered in Virginia and calls itself "the computer software and services industry association," has invented an eleventh commandment: Thou shalt not dupe. However, injunction alone hasn't kept people from duplicating software, so ADAPSO has proposed a true hardware-based protection scheme.

The ADAPSO system would require a lock box and a key. The key would be a small ROM chip that contained a small fraction of a protected program. The rest of the program would be on disk, but without the ROM key the program wouldn't work. The key would go into the lock box, a receptacle about the size of a pack of cigarettes, that, in turn, would plug into a computer's serial port. The lock box would include a pass-through to let you use the port for other things, but its main feature would be a set of slots, or keyholes.

Protected software would come with a disk and a key that you'd have to plug into the lock box. The floppy portion of the program wouldn't be protected, so you could back it up all you wanted. ROM chips seldom go bad, so you wouldn't have to back them up. ROM chips are also damn hard to copy, so the vendor wouldn't

(continues on page 178)



Illustration: Kent Williams

'Twas days before Christmas,

and all through the offices, many creatures were stirring, even the bosses. Year-end figures were wrung by the accountants with care. In the hopes that black ink would somehow appear there.

✓ denotes IBM-AT compatibility.

SOFTWARE

We only carry the latest versions of products. Version numbers in our ads are current at press time.

Alpha Software

✓Keyworks	\$49.
✓Database Manager II 2.02	169
✓Electronic Desk 1.1 (w/Keyworks)	195.

Ashton-Tate

✓dBase II 2.43	call
✓dBase III	call
✓Framework II	call

Best Programs

PC Connection 15-day money back guarantee on these Best Programs.

✓PC/Tax Cut (1986 version for 1985 taxes)	124
✓Personnel Series Level I	279.
✓Personnel Series Level II	419.
✓Personnel Series Level III	559.
✓Personal Finance Program 2.0	65.
✓Professional Finance Program 4.0	149.
✓PC/Fixed Asset System 3.0	329.

Bible Research

✓THE WORD 3.0 (KJV Bible)	145.
✓THE WORD 3.0 (NIV Bible)	145.

Borland International

✓Turbo Tutor 1.0	19.
✓Turbo Database Toolbox 1.1	30.
✓Turbo Graphics Toolbox 1.0	30.
✓Turbo Editor Toolbox 1.0	37.
✓Turbo Gameworks 1.0	37.
✓Turbo Newpak (Gameworks and Editor)	52.
✓Turbo Lightning 1.0 (w/spelling dictionary and thesaurus)	57.

✓Sidekick 1.5 (copy-protected)	30.
✓Sidekick 1.5 (non-protected)	48.
✓Reflex 1.0	57.
✓Superkey 1.1	57.
✓Superkey/Sidekick Package (includes \$15 rebate coupon from Borland)	67.

✓Turbo Pascal 3.0	37.
✓Turbo Pascal 3.0 w/BCD	59.
✓Turbo 8087 3.0	59.
✓Turbo 8087 3.0 w/BCD	72.
✓Turbo Holiday Pak (Pascal 3.0, Tutor, and Database Toolbox)	67.
✓Turbo Holiday Jumbo Pak (Pascal 3.0, Database, Editor & Graphics Toolboxes and Gameworks)	special

PC Connection Software Special through January 31, 1986

BORLAND INTERNATIONAL Turbo Holiday Jumbo Pak

Includes:

- Turbo Pascal 3.0
- Turbo Tutor (steps you from the basics right through advanced programming concepts & techniques)
- Turbo Graphics Toolbox (create business graphics, easy windowing and store screen images to memory)
- Turbo Database Toolbox (3 modules: Turbo Access, Turbo Sort & General Installation System)
- NEW! Turbo Gameworks (Chess, Bridge and Go-Moku)
- NEW! Turbo Editor Toolbox (build your own word processor)

For the IBM-PC, XT and AT \$125

BPI Accounting Software

✓General Ledger C.13	289.
✓Accounts Payable C.13	289.
✓Accounts Receivable C.13	289.
✓Business Builder (G/L, A/R, A/P, Payroll, information management, spreadsheet, business graphics and word processing)	399.

Breakthrough

✓Timeline 2.0	249.
---------------	------

Broderbund

✓Bank Street Writer	49.
✓Print Shop	35.
✓Graphics Library #1	22.

Conceptual Instruments

✓The Desk Organizer 2.0	59.
-------------------------	-----

Connecticut Software

✓Sideline 5.0	37.
✓Printer Boss 5.0	99.

Dac Software

✓Dac Easy Accounting 1.0	45.
--------------------------	-----

Decision Resources

✓Chart-Master 6.1	237.
✓Diagram-Master 5.0	207.
✓Sign-Master 5.1	157.

Digital Research

✓GEM Desktop 1.1	30.
✓GEM Drew 1.0 (includes Desktop)	93.
✓GEM Collection 1.0 (includes Desktop, Paint and Write)	119.

Dow Jones

✓Market Manager +	\$145.
✓Spreadsheet Link	145.
✓Membership Kit	19.

Enertronics

✓Energraphics 1.3	165.
✓Evergreen	

✓One Write Plus 1.0	169.
---------------------	------

Financial Software

✓Financier II 2.1	59.
-------------------	-----

Friendlysoft

✓Friendly Writer 3.2 (w/Friendly Speller)	55.
---	-----

Funk Software

✓Sideways 3.0	37.
---------------	-----

Graphic Communications

✓Graphwriter Combo Set	305.
✓Freelance	189.

Harvard Associates

✓PC LOGO 2.0	89.
--------------	-----

Harvard Software

✓Harvard Project Manager 1.16	209.
✓Harvard Total Project Manager 1.0	289.

Human Edge

✓Mind Probe	27.
-------------	-----

Infocom

✓Cornerstone 1.0	279.
------------------	------

Lifetree

✓Volkswriter 3 (w/TextMerge)	159.
------------------------------	------

✓Volkswriter Scientific 1.0	289.
-----------------------------	------

Living Videotext

✓ThinkTank 2.0	109.
----------------	------

Ready 1.0

✓Ready 1.0	49.
------------	-----

Micro Education (MECA)

✓Jim Fox Running Program 1.2	49.
------------------------------	-----

✓Managing Your Money 2.0	99.
--------------------------	-----

Micropro

✓Easy 1.0	97.
-----------	-----

✓WordStar 3.31	179.
----------------	------

✓WordStar Propack 3.31	259.
------------------------	------

Hard disk recommended for Wordstar 2000 & Wordstar 2000 Plus

✓WordStar 2000 1.01	259.
---------------------	------

✓WordStar 2000 Plus 1.01	299.
--------------------------	------

Microrim

✓Extended Report Writer 1.2	85.
-----------------------------	-----

✓Clout 2.0	135.
------------	------

✓Rbase 5000 1.01	369.
------------------	------

✓Upgrade Kit to Rbase 5000	129.
----------------------------	------

Microsoft

✓Multiplan 2.0	119.
----------------	------

✓Microsoft Word 2.01 (w/Ready)	call
--------------------------------	------

✓Microsoft Project 2.0	call
------------------------	------

✓Microsoft Chart 2.0	call
----------------------	------

PC CONNECTION®

When inside my brain,

there arose such a clatter,

I looked up from my keyboard to see what
was the matter. Away to my notepad I flew like a flash,
to see what I'd done in Christmases past.

The following Microsoft mice now
come with PC Paintbrush 3.0 software:

Microsoft Bus Mouse with software 5.0 \$135.
Microsoft Serial Mouse with software 5.0 135.

LANGUAGES

Quick Basic 1.0 69.
Pascal Compiler 3.31 175.
Fortran Compiler 3.31 205.
Basic Interpreter 5.28 205.
Basic Compiler 5.36 235.
C Compiler 3.0 235.
Business Basic Compiler 1.10 258.

Microsoft

Crosstalk XVI 3.6 95.
Remote 1.3 95.
Infoscope 1.02 129.
Transporter 1.4 (includes Crosstalk) 169.

Multimate International

Just Write 1.0 79.
Multimate 3.31 call.
Multimate Advantage 3.5 call.

Peter Norton

Norton Utilities 3.1 59.
Nantucket Software

Clipper 349.

Powerbase Systems

Powerbase 2.1 197.

Quarterdeck

DesqVIEW 65.

Roscoff

Prokey 4.0 89.

Satellite Software

WordPerfect 4.1 239.

Scarborough Systems

Your Personal Net Worth 1.1 59.

Simon & Schuster

Webster's New World Speller 1.2 39.

Software Digest

Reflex Newsletter

This publication is unparalleled for its
comprehensive, reliable evaluations. 1985's
issues evaluate the following programs: word
processors, file mgt., database mgt.,
spreadsheets, graphics, integrated acting,
project mgt., communications, integrated
productivity.

Single copy 24.50.

Year subscription 245.00.

Softstyle

Printworks 1.05 39.

Software Group

Enable 1.1 call.

Software Publishing

PFS:Prof B.00 59.

PFS:Report B.01 77.

PFS:Access A.00 84.

PFS:File B.01 \$84.

PFS:Graph B.01 84.

PFS:Plan A.01 84.

PFS:Write C.00 (w/PFS:Prof) 84.

First Success (Combo Pack includes PFS:
Write, Proof, Plan, File) 229.

Sorcin/IUS

SuperCalc 3.2.1 (w/Sideways) 199.

Spectrum Holobyte

Art Studio 32.

Springboard

Newsroom 30.

Clip Art Volume 1 (for Newsroom) 19.

Unison

Art Gallery 1 22.

PrinterMaster 1.1 37.

United Software

EinsteinWriter 7.2 (w/coupon for free
Speller) 99.

Infospace Accountant 2.05 109.

ASCIIL Pro 4.23 69.

Xanaro

Ability 1.0 call.

TRAINING

ATI

SKILL BUILDER PROGRAMS

Intro and How To Use:

Word Processing MS-DDS

Business Software PC-DDS

Data Bases Typing Tutor

Compaq BASIC

IBM-PC each 38.

TRAINING POWER PROGRAMS

How to Use:

dBase II dBaseIII Lotus 1-2-3

MS Word Supercalc 3 Multimate

Multitran Wordstar Framework

Wordperfect Symphony Displaywrite 3

..... each 49.

Friendlysoft

PC Intro Set 35.

INDIVIDUAL SOFTWARE

The Instructor II 35.

Professor DOS 47.

Tutorial Set (both items above) 75.

Professor Pixel 47.

Typing Instructor 39.

Training for Lotus 1-2-3 \$49.

Training for dBase III 49.

Training for Project Management 49.

Scarborough Systems

MasterType 26.

Simon & Schuster

Typing Tutor III 33.

EDUCATIONAL

Berron's

Computer SAT 59.

Designware

Spellcopter (ages 6 to adult) 25.

Mission Algebra (ages 13 to adult) 27.

European Nations (ages 9 to adult) 27.

Grammar Examiner (ages 9 to adult) 27.

States and Traits (ages 9 to adult) 27.

Digital Research

Diagnostic Test (PSAT) 14.

OwlCat SAT (15 hours) 63.

OwlCat SAT (60 hours) 169.

Eduware

Algebra 1 22.

Algebra 2 22.

Algebra 3 22.

Harcourt Brace Jovanovich

Computer SAT 49.

Computer GRE 57.

Scarborough Systems

Build-a-Book (ages 2 to 12) 19.

Simon & Schuster

Lovely's SAT 39.

Spinnaker

All Spinnaker products now work with

DOS 2.x and 3.x.

Educational Games for Young Computer

Users. (All require graphics board)

Face Maker (ages 3 to 8) 18.

Kids on Keys (ages 3 to 9) 18.

Fraction Fever (ages 7 to adult) 18.

Kinder Comp (ages 3 to 8) 18.

Alphabet Zoo (ages 3 to 8) 20.

Kidwriter (ages 6 to 10) 20.

Trains (ages 3 to 8) 20.

Snooper Troops I (ages 10 to adult) 23.

Snooper Troops II (ages 10 to adult) 23.

In Search of the Most Amazing Thing

(ages 10 to adult) 23.

Delta Drawing (ages 4 to adult) 27.

President's Choice (ages 4 to adult) 27.

Springboard

Fraction Factory (ages 8 to 14) 19.

Make A Match Math (ages 2 1/2 to 6) 19.

Piece of Cake Math (ages 7 to 13) 22.

Early Games for Young Children

(ages 2 1/2 to 6) 22.

1-800/243-8088

PC Connection

6 Mill St., Marlow, NH 03456

603/446-3383

For the IBM-PC Exclusively.

IBM PC CONNECTION®

The glow on the screen,

told a tale sad but true. I'd forgotten
to get presents for people I knew! A modem for mother,
Zork for the kids. Tycoon for the chief,
and a hard drive for Sid.

Springboard (continued)

- Music Maestro (ages 4 to 10).....\$22.
- Easy As ABC (ages 3 to 6).....24.

Stone (requires graphics board)

- Across the U.S.A. (ages 5 and up).....22
- My Letters, Numbers, Words (ages 1 to 5) 29
- Kids Stuff (ages 3 to 8).....29
- Memory Master (ages 3 to 8).....29

The Learning Company

- Addition Magician (ages 6 to 10).....23
- Magic Spells (ages 6 to 10).....23
- Word Spinner (ages 6 to 10).....23
- Reader Rabbit (ages 5 to 7).....26
- Moptown Hotel (ages 8 to 13).....26
- Number Stumper (ages 6 to 10).....26
- Moptown Parade (ages 8 to 12).....26
- Rocky's Boots (ages 9 and up).....32

RECREATIONAL

Blue Chip

- High finance simulations.....
- Baron.....32
- Millionaire.....32
- Squire.....32
- Tycoon.....32

Broderbund

- Championship Lode Runner.....23
- Ancient Art of War.....27

CBS

- Murder By The Dozen (your turn, Sherlock).....21

Electronic Arts

- Pinball Construction Set.....25
- Dr. J/Larry Bird One-on-One.....28
- Music Construction Set.....28

Friendlysoft

- PC Arcade.....35

Funtastic

- Among the finest arcade style games available.....
- Cosmic Crusader.....27
- Snack Attack II.....27
- Big Top.....29
- Master Miner.....29

Hayden Software

- Sargon III (highest rated Chess program) 35

Infocom (Difficulty levels shown in italics)

- JUNIOR.....
- Seastalker.....25

STANDARD

- Enchanter.....
- Cuthroat.....
- Hitchhiker's Guide.....
- the Witness.....
- Planetfall.....
- Wishbringer.....
- Zork I.....

ADVANCED

- Zork II.....
- Zork III.....
- Sorcerer.....
- A Mind Forever Voyaging.....

EXPERT

- Deadline.....
- Starcross.....
- Suspended.....
- Spellbreaker.....

Invisives (hint booklets) are available for most Infocom games. Specify game.....6.

Microleague Sports

- Microleague Baseball (you are the manager).....25

Microprose

- F-15 Strike Eagle.....22

Microsoft

- Flight Simulator 2.12 (now works with Hercules Mono Card).....32

15Step Software

- Golf's Best (break 70 at Pinehurst No. 2) 32

Origin Systems

- Ultima III.....39

Parlor Software

- Bridge Parlor (the best Bridge simulation).....49

PCSoftware

- Championship Blackjack.....23
- Chess 2001.....27
- Armchair Quarterback.....27

Professional Software

- Trivia Fever.....22
- Trivia Fever II.....15
- Super Sports Trivia.....18

SEGA

- Spy Hunter.....29
- Sierra On-Line.....

Championship Boxing

- Frogger.....24
- Ulysses.....24

King's Quest

- King's Quest II.....33
- King's Quest III.....33

Sir-Tech

- Wizardry.....42
- Spectrum Holobyte.....

GATO

- Sublogic.....27
- Night Mission Pinball.....29

Jet

- Scenery (airport) disks are available for Jet—100 airports.....each 15

Telerium

- Rendezvous with Rama.....27
- Amazon.....27
- Fahrenheit 451.....27

XOR

- NFL Challenge (be the coach).....\$79.

HARDWARE

AST Research

All AST Boards come with a full one year warranty.

- SixPakPlus 64k upgradeable to 384k, with clock calendar, serial & parallel ports & now includes Sidekick version 1.5 non-copy protected (game port optional).....225

- 384k (fully populated).....239
- MegaPlus II 64k upgradeable to 256k (or more with MegaPak) with clock calendar and serial port (parallel, game, or second serial port optional).....249

- I/O Plus II with clock calendar and serial port (parallel, game, or second serial port optional).....125

- Parallel, game, or second serial port (parallel, game, or second serial port optional).....35

- for any AST board (specify board).....579

- AST-5251-11.....579

- AST-3780.....579

- Flash Modern half card 300/1200 baud internal modem includes Crosstalk XVI 339

- Advantage 128k upgradeable to 1.5 Meg (or more with Piggyback Card), with serial, parallel ports, now includes Sidekick version 1.5 non-copy protected (game port and second serial port optional).....399

- RAMpage! upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS).....call

Amdak

- Video 300G composite monitor (green) 129
- Video 300A composite monitor (amber) 139

- Video 310A mono monitor (amber).....169
- Color 600 - RGB monitor.....399

- Color 700 - RGB monitor.....439

Compucable

- Plastic Keyboard & Drive Cover Set.....17
- IBM Mono Screen Enhancement.....17

Cuesta

- Uninterruptable power backup units
- Datasaver 240 WATT.....call

- Datasaver 400 WATT.....call

Curtis

- ACCESSORIES.....
- PC Pedestal (for IBM Mono or Color).....37

- Portable Pedestal.....47
- System Stand.....19

- System Stand for IBM-AT.....37
- Low Profile Tilt and Swivel Pedestal.....37

- Crystal 300-watt (line conditioner).....159

IPG-CONNECTION®

It gave me great pain.

There was so much to do!

How could I possibly see this list through?

When what to my wondering eyes should appear, but
PC Connection's number big, bold, and clear.

CABLES

- AC Plug Adapter (any monitor to your PC) 8
- Smartmodem to IBM Cable \$17.
- Keyboard Extension Cable (3 to 9 feet) 27
- Extension Cables for IBM Mono Display 33
- Color and Monochrome Extension cables 39
- Printer-to-IBM cable 17.

SURGE SUPPRESSORS

All surge suppressors have an on/off switch.

- Safesrip 21.
- Diamond (6 outlets) 28.
- Emerald (6 outlets; 6 ft cord) 34.
- Sapphire (3 outlets; EMI/RFI filtered) 44.
- Ruby (6 outlets; EMI/RFI filtered; 6 ft cord) 50.
- Command Center (5 outlets; EMI/RFI filtered; digital clock; master key switch; circuit breaker) 123.

Data Products

- 8050 color printer call
- 8070 color printer call

Epson

All Epson dot matrix printers have built in graphics capability. In addition, the LX-80, FX-85, FX-185 and LX-90 can all print in near letter quality (NLQ).

- DX-10 (letter quality) call
- DX-20 (letter quality) call
- FX-85 (replaces FX-80+) call
- FX-185 (replaces FX-100+) call
- JX-80 call
- LX-80 call
- LX-90 call
- SQ-2000 Ink Jet call
- Epson Books 15.
- Printer-to-IBM cable 15.

We are an authorized Epson service center.
Ask about the extended service plan.

FTG

- Light Pen 195.
- Demo Disk for Light Pen 39.

Hayes

- Smartmodem 300 149
- Smartmodem 1200 389
- Smartmodem 1200B (w/Smartcom II) 349
- Smartmodem 1200B (no software) 289
- Smartmodem 2400 579
- Smartcom II 2.1 (software) 89
- Transet 1000 289.
- Accessory Kit for Transet 1000 (cable and software) 29

PC Connection Hardware Special

through January 31, 1988

QUADRAM

The Gold Quadboard 2k

Quadram introduces a new standard in PC enhancements.

Includes:

- Memory expansion to 640k using 64k or 256k chips
- RGB and Composite Video Output
- Parallel and serial port (2nd, parallel or serial port optional)
- I/O bracket, clock calendar
- Keysaver, QuadMaster III Software, PolyWindows DeskPlus™, QuadPaint
- 100% IBM-PC compatibility... \$369.

Hercules

- Hercules Color Card (parallel port) 169.
- Hercules Graphics Card (parallel port) 289
- Hercules Graph-X Software 2.0 42

Innovative Concepts

- Rip n' File 50 12.
- Rip n' File 50 w/lock 18.
- Library Case (holds 10 disks) 4.

Kensington Microware

- Masterpiece 94.
- Masterpiece Plus 129.
- Printer/portable computer stand 17.

key tronic

- 5150 keyboard 139.
- 5151 keyboard (deluxe) 169
- 5153 keyboard (with touch pad) 289.
- AT Converter (allows Key tronic 5151 keyboard to work with the AT) 12.

Kraft

- Joystick 29
- Executive Cursor Control (w/Joystick) 47.
- Executive Cursor Control (software only) 27.

Mouse Systems

- PC Mouse (w/software, pad, & PC Paint) 139.

NEC

- Pinwriter P2-3 (IBM, 80 column) \$559
- Pinwriter P3-3 (IBM, 132 column) 759
- Pinwriter P5 (IBM, 132 column) 899
- Spinwriter 2050 (letter quality 17 cps) 679
- Spinwriter 3550 (letter quality 32 cps) 1099
- Spinwriter 8850 (letter quality 50 cps) 1489

Orchid Technologies

All Orchid Boards come with PCnet Drive (Ram disk), PCnet spool (print spooling), disk caching & partitioning. Conquest Multifunction Board 2k upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS), includes clock calendar, serial port, and parallel port. A PCnet Daughter Board can be added 289

- PCnet Daughter Board piggybacks to Conquest with networking software call
- PC Net (stand alone card) call
- PC Turbo 186 w/256k and Turbo Daughter Board expandable to 640k, increase the speed of your PC call
- Ecall Multifunction Card for the AT 2k upgradeable to 1 Meg, fully supports LOTUS/INTEL expanded memory specification (EMS) and Error Correction Code (ECC), (serial and parallel ports optional) call

Paradise Systems

- Modular Graphics Card 275.
- Backpack for Modular Graphics Card (2k upgradeable to 384k) 225.
- Multidisplay Card 195
- Five Pack w/384k 149

PC Designs

- FD 1000 Computer 789.
- PC Magazine called it "a top performance bargain" (Oct. 15). PC Week called it "a terrific machine at a terrific price" (May 10). Please call for more information about this computer.

Princeton Graphics

- HX-12 RGB monitor (690 x 240) 449.
- HX-12E RGB monitor (EGA compatible) 589
- MAX-12E Amber monochrome monitor 179
- SR-12 RGB monitor (690 x 480) 597
- ISM Scan II Board for SR-12 149

1-800/243-8088

PC Connection 190M
6 Mill St., Marlow, NH 03456
603/446-3383

For the IBM-PC Exclusively.

PC CONNECTION®

Call 800/243-8088.

I dialed that number. They got it all straight.
And I heard them exclaim as they resolved my poor plight,
"Happy Holidays to all, and to all
a good night."

Quadram

Expanded Quadboard with clock calendar, parallel, serial & game port, I/O bracket, and Quadmaster software.
384k (fully populated) \$219
2k (upgradeable to 384k) 189
Gold Quadboard 2k upgradeable to 640k, includes Quadmaster III software, clock calendar, serial port, parallel port, and IBM compatible color graphics (second serial or parallel port optional) special
Silver Quadboard 2k upgradeable to 640k, includes Quadmaster III software, clock calendar, two serial ports, and game port 215
Liberty Board 64k upgradeable to 2Mb, fully supports LOTUS/INTEL expanded memory specification (EMS) 287
Quad Sprint w/8086 processor, increases the speed of your PC 479
Short Ram Card 64k 169
Microfazer Printer Buffer (parallel) w/copy MP 64 (64k) upgradeable to 512k 159
Quadcolor 1 197
Quadchrome Monitor 469

SMA

PC-Document Keyboard Templates available for:
DOS/Basic 1.1 Supercalc 3
DOS/Basic 2.0-2.1 Wordstar
DOS/Basic 3.0-3.1 Wordstar 2000
Lotus 1-2-3 Turbo Pascal
Symphony WordPerfect
Multiplan (IBM) dBase III
Multiplan (Microsoft) dBase III
Framework Ultimate
Volkswriter Deluxe each 12.

Toshiba

All Toshiba printers listed are 24 pin dot matrix.
P1340 printer (80 column) 469
P341 printer (136 column) 899
P351 printer (136 column) w/serial and parallel interfaces 1129
WICO
Joystick 35.

DRIVES

All floppy drives are completely pre-tested and are supplied with a printout of the test results. They are shipped with complete step-by-step installation instructions. Drives are 320k/360k.

Control Data (CDC)

(5 1/4") half-height drive (DS,DD) \$75.
IOMEGA
Bernoulli Box 20 Meg 2349
10 Meg cartridge 48
Head Clearing Kit 69
Standard Interface (PC2) Card 129
We are an authorized IOMEGA service center.

OUR POLICY

- We accept VISA and MASTERCARD
- No surcharge added for charge cards
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order
- No sales tax
- All shipments insured; no additional charge
- Allow 1 week for personal and company checks to clear
- UPS Next-Day-Air available.
- COD max. \$1000. Cash or certified check
- 120 day guarantee on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30
- You can call our business offices at 603/446-3383 Monday thru Friday 9:00 to 5:30

SHIPPING

Continental US: For monitors, printers, and drives, add 2% for UPS ground shipping. Call for UPS Blue or UPS Next-Day-Air. For all other items, add \$2 per order to cover UPS shipping. We will automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.
Hawaii: For monitors, printers, and drives, actual UPS Blue charge will be added. For all other items, add \$2 per order. **Alaska and Outside Continental US:** Call 603/446-3383 for information.

Seagate

20 Meg Internal Hard Drive (w/controller, cables, and manual) \$479.
Shugart
10 Meg Internal Hard Drive (w/controller, cables, and manual) 379.
Taifgrass Technology
TG 5025-25 Meg Hard Drive (w/controller and 60 Meg Backup Unit) call
Tandon
TM 100-2 (5 1/4") full-height drive (DS,DD) 95.
TEAC
FD-558 (5 1/4") half-height drive (DS,DD) 85.
Toshiba
AT 380k Drive (5 1/4") half-height drive 99

MEMORY

64k Memory Upgrade Set for IBM-PC or XT system board or any memory board
150 nanosecond (set of 9) 8.
200 nanosecond (set of 9) 7.
Install memory upgrades & run diagnostics at time of board purchase only 10
128k Memory Upgrade Set for IBM-AT System Board (9 chips piggybacked) 29.
256k Memory Upgrade Set for any IBM-AT memory board (9 chips) 29.

DISKS

DS/DD Disks for the PC & XT (40 TPI).
10 disks per box.
Maxell MD-2 19.
Verbatim Datalife (w/free calculator—for a limited time only) 19.
DS/High Density Disks for the AT (96 TPI).
10 disks per box.
Fujitsu 39.
Maxell 39.
Verbatim 45.
Flip Sort (holds 75 disks) 15.

INFORMATION SERVICES

Compuserve

Compuserve Information Service (includes subscription, manual, 5 hours of connect time, monthly publications) 19.
Dow Jones
Membership Kit 19
Source Telecomputing
The Source (subscription and manual) 39

1-800/243-8088

PC Connection 190M
6 Mill St., Marlow, NH 03456
603/446-3383

For the IBM-PC Exclusively.

* DEFECTIVE SOFTWARE REPLACED IMMEDIATELY. DEFECTIVE HARDWARE REPLACED OR REPAIRED AT OUR DISCRETION. SOME ITEMS HAVE WARRANTIES UP TO FIVE YEARS.
©COPYRIGHT MICRO CONNECTION, INC. 1993. ALL ITEMS SUBJECT TO AVAILABILITY. PRICES SUBJECT TO CHANGE WITHOUT NOTICE.
PC CONNECTION AND PC CONNECTION ARE REGISTERED TRADEMARKS, AND MICRO CONNECTION IS A TRADEMARK, OF MICRO CONNECTION, INC., MARLOW, NH.
THE RACCOON CHARACTER (S) IS A TRADEMARK OF MICRO CONNECTION, INC., MARLOW, NH.

PC CONNECTION®

CIRCLE 339 ON READER SERVICE CARD



PC Persistence.

Or, Paradise Revisited.

Remember this picture? We used it in our very first raccoon ad about two years ago. Back then we wrote your orders out by hand, and filed them on top of the fireplace mantle. 256K was a lot of memory. And, according to our calculations, only about 10% of the people now reading this ad even owned a PC.

But persistence has paid off. We've grown and thrived throughout all the trials and tribulations of the PC marketplace. Why we don't even have to sell moonshine anymore to make ends meet.

Traditional values.

Shortly after our world famous micro mascot first plowed his way through your typical Marlow snowdrift, we cleared off the mantle and loaded everything into an IBM System 38. This mighty mainframe gives our sales consultants instant access to a multitude of mesmerizing minutiae. Like product availability, the status of your order, how much memory a program requires, what printers it supports, and whether a new version is expected soon.

With an ever-increasing array of electronic wizardry at their fingertips, our persistently pleasant phone people

can help you take your PC to new pinnacles of performance. You see, we still go to mind-boggling lengths to answer your *toll-free* technical questions—before or after the sale. We still guarantee every product we sell for a full 120 days, and many for longer than that. Our prices are still consistently among the lowest around. And, if a price ever goes down before we ship, you will automatically get the new low price.

Only a 4.3 light year drive from Alpha Centuri.

Alas, Marlow, NH remains a bit off the beaten track for even the most adventuresome of our customers. But you still have a standing invitation to visit us the next time your business takes you to Boston, or pleasure takes you to the ski areas of Vermont and New Hampshire. This spring we'll be opening our completely renovated store and training center in the old Christmas Trees Inn (partially pictured above) across the river from our headquarters.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, call ahead to make sure what you want is in stock. The showroom closes at 8:00 M-F and at 5:00 on Saturday.

For the IBM-PC (XT & AT) exclusively.

PC CONNECTION

Copyright Micro Connection, Inc. 1988. MICRO CONNECTION and the raccoon character(s) are trademarks of Micro Connection, Inc. PC CONNECTION is a registered trademark of Micro Connection, Inc. WATLOW, NH

have to worry about piracy.

So long as you left the key in the box, you could run the program any time. If you wanted to run it on another machine, you'd have to crawl behind your computer, pull out the key, and take it with you. You'd also have to have a serial port and a lock box on each machine. Finally, software vendors would have to set standards for the physical characteristics of the key and lock box and for the communications protocols between key and computer. Without standards, you'd have to have a different lock box for each program.

ROM chips are cheap, so the key would probably cost no more than \$3 or \$4. Lock boxes, even if they were made out of plastic in Taiwan, would cost more. The user, of course, would pay for this stuff.

In spite of ADAPSO's enthusiasm, its key and lockbox proposal has run into a very serious obstacle. Since ADAPSO is made up of competing software houses, the association has to get Justice Department permission before it can set standards. Otherwise the key might be seen as anticompetitive. Last December, ADAPSO asked for a formal "business review letter" from the Justice Department so it could proceed with the proposal. Nearly a year later, the department is still sitting on its hands. Says Dave Sturtevant, senior director of public communications for ADAPSO, "We're now on hold and about as frustrated as you can get." He doesn't know why the Justice Department won't move.

A different hardware-based protection scheme that won't need a green light from the bureaucrats has been developed by Gordian Systems Inc. of Palo Alto, California. The Access Key system works by encrypting or scrambling a program. You can copy it all you want, but it's still scrambled. When you try to run the program, you get a logo screen, a series of flashing lights, and an invitation to type in a password.

The password is coded in the flashing lights, and once again you need a hardware "key" to figure it out. The key is a device about the size of a big eraser with a window at one end and a small, watch-sized liquid crystal panel on one side. When you hold the window up to the flashing lights, a battery-powered chip inside the key de-

The Master Copiers

Each of these five programs has its strengths and weaknesses, but all share a common goal: copying protected software.

Software vendors protect their products for only one reason: They don't trust you. They're afraid that any program that can be copied will be pirated—and they're right. Many computer users don't understand that taking home a copy of a friend's program is like stealing it from a store.

But the software vendors' right to protect their products runs smack into the users' right to protect their investments. Magnetic storage isn't perfect; nothing can spoil your day like a program that won't run. A back-up copy can prevent disaster.

A few small software companies have sided with the user against the vendor. They sell programs that break copy-protection schemes. For copy protectors, these programs are the tools of the pirate's trade, and anyone who sells them is the enemy.

The mainstream software industry has managed to keep these black sheep out of normal retail channels. Many computer stores won't carry them for fear of pressure from the vendors of protected programs, and computer magazines have traditionally tried to ignore them for fear that other advertisers will take business elsewhere.

As a result, copy busters are sold almost exclusively by mail and rely on word-of-mouth advertising. But even this shadowy market has found room for at least five different copying programs for the IBM PC and compatibles. Whether they're used to make legitimate back-ups or illegal copies, clearly there's a demand for them.

All the copying programs I tested come with clear warnings against piracy and none are copy-protected. At the simplest level, they all work by analyzing the format and contents of an original disk and trying to reproduce them on a target disk. It's very much like running the

DOS DISKCOPY command, except that this process takes much longer.

In terms of performance, though, these products diverge sharply (see table). Because copy programs are rarely reviewed by the press, second-rate software can sell for the same price as the best.

Generally, if a program can copy one disk that uses a particular protection scheme, it can copy any software that uses it. Since Lotus Development Corp. and Ashton-Tate have switched to Softguard Systems Inc.'s *SUPERLoK* copy-protection scheme for their latest releases, there's a clear line between products that defeat *SUPERLoK* and those that don't. The standard copy-protection-breaking procedure doesn't work on *SUPERLoK*, so programs that break it must use a special technique: They capture the protected .COM file and turn it into an unprotected .EXE file.

Vault Corp.'s *PROLOK* is another protection technique that can't be defeated by the normal copying procedure. Although it's not currently used on any really popular software, it can be broken by only two of the five copying programs reviewed here.

Bear in mind that the protection wars never end. Both the protectors and the copiers come out with new versions as often as once a month. By the time you read this article, the results of PC Magazine Labs' tests will be out of date. By then, the latest releases of the better copying programs should be able to copy Version 2.0 of 1-2-3 and Version 1.1 of *Symphony*. The best way to find out if a program will copy your software is to contact the manufacturer of the copying program.

The Lineup

Personal Copier from Disk-Tech is the lightweight of the lot. It defeats only

the simplest protection schemes and doesn't come with any supplementary programs for dealing with anything complex. After you load *Personal Copier*, you stick the original in one drive and a disk in the other and hit the designated Go key. After 9½ minutes, you either have a working copy or you don't. The instructions all fit on one page, and that's all you need.

Central Point Software's *Copy II PC* is a much better product for the same price. Not only does it copy just about everything except *PROLOK*-protected disks, it also comes with a utility that lets you run protected software from a hard disk without putting the key disk in the A: drive. *NOKEY.COM* is a small, memory-resident program that intercepts the query to the A: drive and makes the program think it's found the fingerprint on the key disk. It works with *1-2-3*, *Symphony*, *SideKick*, and the older versions of *dBASE* and *Framework* that required a key disk. Other programs on the market do the same thing. *Hardrunner*, at \$39.95 for a protected version and \$69.95 for an unprotected version, is probably the best known. But why would you buy it if *Copy II PC* does the job at no extra cost?

Copy II PC comes with a long list of the software that it can copy and gives special copying instructions when necessary. It claims to have a routine for breaking *SUPERLOK* protection, even though it failed to work on the *SUPERLOK*-pro-

tected copy of *Spotlight* I tried.

The program also has a utility to check the speed of your drives. This statistic can be important if your drives run at slightly different speeds because you'll get better copies if you copy from the faster drive to the slower drive.

Generally, if a program can copy one disk that uses a particular protection scheme, it can copy any software that uses it.

The instruction booklet is only 5 pages long, but it's clear and adequate.

Locksmith PC from Alpha Logic Business Systems is primarily a disk housekeeping utility program, but it also backs up some protected disks. You can use *Locksmith* to salvage deleted files, examine and change sector data, and analyze disks by track or sector. You can also hide and "unhide" files or encrypt and decrypt them.

The disk utilities are good, but the copy program isn't. Alpha Logic promises updates that can beat *PROLOK* and *SUPERLOK*, but in the meantime, *Locksmith*'s disk-analysis tools are supposed to let you figure out copy-protection schemes and duplicate them yourself.

The 60-page manual does have a lot to

say about copy protection and about how disks are formatted, but it doesn't say it well. Clusters, boot records, sector gaps, and cyclical redundancy are complex stuff, and this isn't a clear introduction to them. *Locksmith* originally made a name for itself on the Apple and its PC version still has a recently ported look to it.

Disk Mechanic from MLI Microsystems, like *Locksmith*, is a file-utility program that also backs up disks—but the difference is that *Disk Mechanic* is an excellent back-up program. It can defeat both *SUPERLOK* and *PROLOK* and comes with a list of what it can copy along with special instructions for breaking unusual protection schemes.

The file utilities handle such functions as retrieving erased files, hiding and un-hiding, and disk mapping. You can use *Disk Mechanic* to examine or modify any byte in any sector and to check the speeds of your drives.

Disk Mechanic comes with a 60-page manual that, alas, is no clearer than *Locksmith*'s. As the manual suggests, you could probably use *Disk Mechanic*'s utilities to beat copy-protection schemes that haven't been invented yet, but it would take more work and patience than you're likely to have.

A Licensed Scheme

Quaid Software Ltd.'s *Copy Write* is a copy program and nothing more, but it's probably the best. Its copyrighted techniques for defeating *SUPERLOK* and *PROLOK* are so good that MLI Microsystems licenses them for use in *Disk Mechanic*. The program is easy to use and does exactly what you expect.

As a tribute of sorts, Vault Corp. (maker of *PROLOK*) has sued Quaid Software for breaking its protection scheme. Near the end of its 20-page manual, Quaid appeals to *Copy Write* customers to help with its fight against Vault. To do so, you can either send money or evidence that you use *Copy Write* to make legitimate backups rather than for piracy.

Quaid puts out a new edition of *Copy Write* every month. You can "subscribe" for \$180 per year. —Jared Taylor

Copying Copy-Protected Software

Type of copy-protection scheme

Copy program	A Lotus proprietary scheme		SUPERLOK		PROLOK	
	Time for copying 1-2-3 1A (minutes)	Symphony 1.0	dBASE III 1.1	FrameWork 1.1	Spotlight 1.0	PowerBase 1.0
<i>Personal Copier</i>	9.5	yes	no	no	no	no
<i>Locksmith PC</i>	12	yes	no	no	no	no
<i>Copy II PC</i>	4	yes	yes	yes	no	no
<i>Disk Mechanic</i>	7.5	yes	yes	yes	yes	yes
<i>Copy Write</i>	3	yes	yes	yes	yes	yes

Each of the five copy programs was tested on six pieces of copy-protected software. All the programs were able to copy 1-2-3; the time they took to do so is given in minutes. The other columns simply indicate whether the copy-protected software could be copied or not.

The Data Encryption Standard

Developed by IBM and adopted and approved by the National Bureau of Standards, the Data Encryption Standard is based on a complicated, effective coding algorithm.

The Data Encryption Standard (DES) is the National Bureau of Standards' (NBS) approved method for protecting sensitive but unclassified computer data. It was adopted in 1977 after the NBS formally solicited encryption algorithms from the public. The one that NBS chose was called the Data Encryption Algorithm (DEA) and was developed by IBM, under the code name Lucifer. DEA is now in the public domain, and it can be used free by any American company. All IBM gets is glory.

NBS got into the algorithm business in order to protect the consumer and to set a uniform standard. Data-protection schemes have been around for a long time, but most users had no idea if they were any good. Now that the NBS has anointed one, most data managers use it with complete confidence. Also, since it's a standard, they don't have to learn a lot of different codes.

Technically, DES is a hardware implementation of the DEA. Encryption programs like *SuperKey* use DEA, but they are not, strictly speaking, DES. Software can be fiddled with, so the NBS puts its official stamp only on hardware.

DEA is a very complex, bit-level algorithm that is described in an NBS publication called *FIPS 46*. A DEA key must be made up of 64 bits, of which 8 are par-

ity bits. In very simple terms, the 56 remaining bits are turned into 16 different subkeys. All 16 subkeys are used on every bit of data, which is processed in blocks of 64 bits. Encryption involves shifting bits around, combining and recombining them until they are thoroughly scrambled. Decryption works backwards through the same steps with the same key.

DEA operates in several modes. In one mode, called chaining, the results of encrypting each block are used as an additional key in encrypting the next block. This is a very secure mode of encryption, but it is seldom used when data must be transmitted. If there is a single transmission error, it will be passed along through the chain during decryption and the data will be unreadable.

Since the algorithm itself is public knowledge, there's no mystery about what's been done to encrypted data. The problem is figuring out the key. Since there are 56 relevant bits to a key, and each bit can be either one or zero, there are 2^{56} or 72,057,594,037,927,946 possible DES keys. That's a little over 72 quadrillion.

Most folks are satisfied with that. In 1980, the American National Standards Institute (ANSI) officially adopted DES. Many U.S. and international banks have

converted to DES for coding their payment instructions. Last August, the U.S. Treasury Department announced that all instructions for moving funds in or out of it would have to be coded with DES.

Still, there are skeptics. The U.S. government doesn't use DES for classified information, which suggests that it thinks DES isn't good enough for data it cares about. This makes one wonder whether the government has been pushing DES because the National Security Agency knows how to crack it. Big Brother could read everyone else's mail but keep its own private.

Some code experts, like Dr. Harold Highland, editor in chief of *Computers & Security* magazine, don't believe in the absolute security of large numbers. "The German Enigma code [used during World War II] had over 50 million keys," he says, "and we broke that by hand." In the age of computers, 72 quadrillion may not be such a huge number after all.

Highland also argues against standards. "It takes a lot of patience to break a code," he says, "so it's got to be worth your time to do it. If every bank in the country is using the same code, it's definitely worth your time." There may be convenience in standards, but there's safety in diversity. —Jared Taylor

codes the six-character password and flashes it on the liquid-crystal panel. You type it in at the keyboard, and the program will unscramble and run.

The Gordian Method

This scheme sounds like the same protection technique that is defeated by snatching the unscrambled version of the program out of RAM. There is, in fact, no defense against a utility that stops execution of a program and reads the contents of memory to disk. However, Gordian claims that the unscrambled version thus

captured will not run. This defensive strategy works by taking a survey of the characteristics of the machine in which the program has been loaded at the time it is unscrambled. Thereafter, it checks every so often and if it finds it has been moved to another machine, it will refuse to run.

One slick feature of The Access Key system is that every time you run the program, it uses a random-number generator to produce a different six-character password. Thus, you never have to remember a password, but you can't run the program without a key. All keys have serial num-

bers so you can get a replacement if you're in a jam.

Just to make things harder for anyone to break the password code, The Access Key changes the coding scheme every 36 hours. When the protection software runs, it first checks the system date and modifies the encryption pattern accordingly. Only then does it throw up the logo screen and ask for the password. How does the key know what decoding method to use? It contains a quartz watch that tells it the date, and it, too, changes its decoding system every 36 hours.

The Gordian key is primarily an encryption/decryption device that is cunningly used to protect software. It can easily be used for data security. In this mode, you use a special software routine to make the key act as an encryptor. What started out as a readable file is now garbage. You use the same software routine and key to decrypt the file. This time, instead of keeping the unscrambled file in memory, the system writes it back to disk in readable form. Thus, the Gordian key is also a weapon in the battle for file security.

Protecting Your Data

There are many ways to keep data out of the wrong hands. One obvious way is to keep it all on floppies and to keep the floppies locked up. If you need more storage, you can use removable hard disks and keep them in a safe.

If you have a fixed disk, one clever way to fool snoopers is to make it look as though the data isn't there. *MagLock*; by Flinder Software Laboratories, is a program that fiddles with the directory table so that DOS doesn't know your files are on the disk. *MagLock* can hide single files, subdirectories, or the contents of a whole disk, and it takes .85 seconds per file no matter how large or small. The data itself is untouched and will show up as bad sectors if you run a CHKDSK. Your files are still accessible to a snoop with a disk utility that reads individual sectors.

AST Research has developed a similar scheme called *Knight Data Security Manager*. It takes between 300K to 400K bytes on your hard disk and will ask for your name and password every time it boots. It is for multiuser systems, and it can be set up to keep certain people out of certain subdirectories. It also has an auditing option that records how much time people spend in which directories and how many times they try to get into off-limits directories. *Knight* is also set up so that if you boot from a floppy, DOS doesn't know the hard disk is there. If you ask for a directory, DOS gives you an "invalid drive spec" message. *Knight* also gives you the option of encrypting files.

Codes and Ciphers

A good way to keep data safe is to make it unreadable to anybody else. Soldiers and

diplomats started doing this thousands of years ago when they invented codes, or ciphers.

Some codes are childishly simple. Take pig Latin. You code a word by moving the first consonant(s) to the end of the word and adding "ay." Implesay odesay ancaay ooklay ickytray. To decode, you do the reverse. This procedure for scrambling and unscrambling data is called an algorithm.

A simple computer-data encryption algorithm might increase the ASCII number of every character by a set number. If you

MagLock fiddles with the directory table so that DOS doesn't know your files are on the disk. It can hide single files or subdirectories in .85 seconds per file.

choose to increase it by 20, the letter K (ASCII 75) would become a hyphen (ASCII 95), and the number 4 would become the letter H. To decode the file, you would reduce all the ASCII numbers by 20. The ASCII shift is the algorithm and the number 20 is the key, or password. An algorithm that consistently replaces one piece of data with another is called a substitution algorithm.

Permutation algorithms are another kind. If you were coding data in blocks of 64 characters, you might move every third character one place to the right. Even such a simple permutation algorithm, in combination with a substitution algorithm, would take a little while for an amateur to figure out. Real computer encryption algorithms, such as the U.S. government's Data Encryption Standard (DES) are, of course, much more complex (see "The Data Encryption Standard").

Although many encryption programs are on the market, one of the most widely available is included in *SuperKey* by Borland International. *SuperKey* actually contains two encryption methods, one a full-blown DES and the other a proprietary Borland algorithm that is not as complex but runs faster.

In both cases, the key or password can

be up to 32 characters long. The encrypted file is written right over the original file, so no trace of the original is left on disk. If you type an encrypted file, all you get is smiling faces, Greek letters, and musical notes.

Borland also offers a text mode for encryption if you want to send code through a modem with a communications program that doesn't handle binary files. This mode produces a file that contains only the capital letters A through Z and is a good deal longer than the original file. If the person at the other end of the phone lines knows the password and also has a copy of *SuperKey*, he can decode the file.

Another company, United Software Security, produces an encryption program called *Privacy Plus*. It, too, offers DES encryption as well as a simpler algorithm that is twice as fast. It also produces text mode for confidential data transmission. Like the Gordian system, it offers a hand-held device that decodes randomly generated passwords from flashing lights on the screen.

One interesting option on *Privacy Plus* is "master-keyed" encryptors, which permit multileveled, or "hierarchical" security. These programs are set up so that no matter what key you use to encrypt a file, there is always another one—a sort of skeleton key—that will also decrypt it. This makes sense in a company where a lot of people work with sensitive data. The security officer issues master-keyed versions of *Privacy Plus* to the employees. They can protect their data from each other and from outsiders, but if someone is out sick or forgets the password, the security officer can use the master key to decode anybody's files.

Hardware Encryption

Master keys may be handy for some purposes, but they point up an important weakness in encryption that's done with software: A clever hacker might fiddle with your program and insert a homemade master key, using it to decode everything you coded, and you might never know.

Encryption on a chip is the solution. Jones Futorex sells encryption boards for the IBM PC that incorporate tamperproof DES-standard chips made by Advanced Micro Devices and Western Digital.

Capture the present. Command the future.

Primavera Project Planner gives successful project managers the three things they want most...control, control, control. What they like, you'll like...

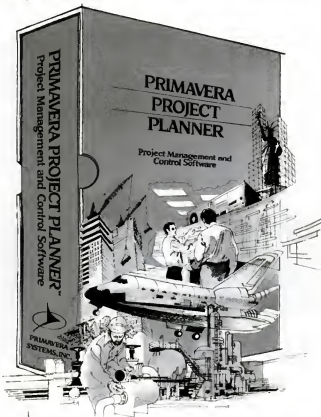
Our capability for managing projects up to 10,000 activities. Resource leveling and cost management. The ability to compare current schedules to targets and to perform "what-if" analysis.

Plus, standard and custom reports to give you the who, what, when, where and why in virtually any format you need.

You can even produce high quality bar charts and network logic diagrams using our optional graphics package, Primavision.

Interested? Contact us for more information or the name of a nearby Primavera dealer.

Primavera Project Planner...the most project management you can get from a micro.



PRIMAVERA SYSTEMS, INC. Suite 925 • Two Bala Plaza
Bala Cynwyd, PA 19004 • (215) 667-8600 • Telex 910 997 0484

COPY PROTECTION

Hardware encryption is also much faster than software encryption: Futurex boards clip along at 12,000 bytes per second. If you were running *1-2-3* or *Word-Star*, the board would automatically encrypt everything you wrote to disk and decrypt everything you read. Your application wouldn't run noticeably slower, your data would never be on-disk in readable form, and you wouldn't have to encrypt your files at the end of the day.

The more expensive Futurex boards go one step further, with an EPROM chip you can program with 64 encryption keys. Once again, a company's security officer would choose the on-board keys and also assign passwords to the system's users. The users' keys would work only with boards that were programmed to accept them. That way, disgruntled employees couldn't buy an identical Futurex board, take it home, and use it to decode company data. Even if they had valid user keys, the new board wouldn't be programmed with the matching on-board key.

As an extra barrier to sub-rosa decryption, 32 of the programmable keys are designed to disappear if you take the board out of the machine. That way you can't even sneak the company board home for a little decoding.

As a final precaution, Jones Futurex puts a steel case around the EPROM chip and fills the case with epoxy. There's a trip wire running through the epoxy, so if you try to cut through it, you'll destroy all the programmable encryption keys. This is real, hard-boiled security and probably more than most people need.

Know Your Enemy

However, the Futurex system underlines one of the differences between copy protection and data security. On the first battle front, it's a clear fight between copy protectors and copy busters. On the second, the combatants aren't always clear. Today's encryption algorithms are so arcane that anything that gets coded stays coded—unless there's an inside job.

But whichever side of the struggle you're on, the battle is far from over, and new weapons go into action every day. ■

Jared Taylor is a contributing editor of PC Magazine.

Turbo, who?

Do you have to give up power and advanced potential to get ease of use and affordability? Not anymore. Because now, you can have UCSD Pascal for only \$79.95!

If you're making your move into programming, there's no better way to go than Pascal. And starting now, you don't have to settle for a stripped-down version of Pascal in order to get a price that's right. Instead, you can choose UCSD Pascal—the recognized Pascal programming standard in colleges and universities throughout the country—at the incredibly low introductory price of \$79.95 for your PC-DOS, MS-DOS, or other popular computer.

Start with the standard

With an entry-level system, you spend a lot of valuable time learning a non-standard form of Pascal. And you don't get all the capabilities a true Pascal system is supposed to deliver—unless you buy a lot of add-on utilities—which can send the cost of your system sky-high! Worst of all, when you're ready to tackle anything more than short, simple programs—you have no choice but to move up to a more sophisticated system (like UCSD Pascal). And at that point, you also have to relearn standard Pascal.

UCSD Pascal has everything you need

With UCSD Pascal, you get a

full-featured, professional programming tool that's been used right now in the development of major scientific and business applications. The system comes with an outstanding text editor, a complete on-line tutorial, 8087 math coprocessor support and BCD (decimal arithmetic) included in the package at no extra cost. In fact, UCSD Pascal contains virtually everything you need—as standard equipment—for developing the simplest to the most

sophisticated programs.

UCSD Pascal is available for MS-DOS, PC-DOS, UNIX, VMS, MSX and many other operating systems. You can use UCSD Pascal to write programs of any size on virtually any computer, and port them to any other computer. And if speed is what you're after, the latest native code version of UCSD Pascal actually benchmarks favorably with Turbo Pascal® in execution time!

Programming that's easy...and fun!

At Pecan Software Systems, we strongly believe programming should be as easy as possible. UCSD Pascal was originally designed for teaching programming skills, so it's extremely easy to learn and to use. With UCSD Pascal, you'll be developing programs right from the start that are easy to write, easy to understand, and easy to maintain. We also believe that programming should be fun. So we've made UCSD Pascal as enjoyable to use as it is powerful.

The right tool at the right price

When the fun gets serious, you'll have a comprehensive programming system right at your fingertips with UCSD Pascal—a system that will help you develop those big-league programs you may eventually want to write—at a price you can readily afford.

Put UCSD Pascal programming power on your PC now for only \$79.95! Order by mail today or phone now 1-800-63-PECAN. UCSD Pascal—the original standard of Pascal programming excellence. The new leader in Pascal price/performance.

PECAN

The UCSD Pascal Company
Pecan Software Systems, Inc.
1410 39th Street, Brooklyn, NY 11218
718-451-3100

UCSD Pascal

UCSD Pascal \$79.95 (for PC-DOS, MS-DOS, AMIGA, APPLE, ATARI 520, MACINTOSH, RAINBOW, TANDY, as well as most popular 8/16/32-bit systems).
Price includes 8087 support and BCD.

Please send _____ copies of UCSD Pascal for my _____ which runs under _____ operating system.

My disk size is 3 1/4" 5 1/4" 8"
Total amount \$_____. Please add appropriate tax.

Payment by ☐ VISA ☐ MC ☐ US Bank Check ☐ Bank Draft

Credit Card Expiration Date _____
Card Number _____

Mail to: Pecan Software Systems, Inc.
1410 39th Street
Brooklyn, NY 11218
ITT Telex No. 484 8910
CompuServe Code 76703, 500

Name _____ State _____ Zip _____
Shipping Address _____
City _____
Telephone _____

Call or write for UNIX, VAX or other UCSD Pascal versions—and ask about our powerful Pascal add-ons, too. **SCHOOLS:** Contact us for our special educational discounts!
Call toll-free or enclose a check with this coupon to place an order. Please add \$2.50 for shipping within the U.S. Foreign orders add \$10 and make payment by bank draft payable in U.S. dollars on US Bank. New York State residents add appropriate sales tax.

UCSD Pascal
Not copy protected
60-day money-back guarantee

CREDIT CARD ORDERS
CALL TOLL-FREE
1-800-63-PECAN
(NYS) 1-800-45-PECAN

MODEMS TAKE TO

Less a modem than

LAN device the ESTeem wireless signals rather than telephone lines lowering

If you still think of modems as gadgets that let computers talk over phone lines, then you obviously



haven't seen the ESTeem Model 84 Wireless Modem from Electronic Systems Technology (EST). As its names implies, this modem has no truck with phone lines, or any other kind of wire.

In looking at the Model 84, you have to ignore the word "modem" and all the associations that go with it. In fact, it's much less a modem than a wireless LAN device capable of handling up to 254 units on the network.

Instead of the phone network, the Model 84 uses a built-in radio transceiver. When sending information, the modem converts the digital signals from your computer into frequency-modulated radio signals. When receiving information, it listens for the FM radio signals from another ESTeem modem and converts them back to digital signals. On the computer side of the connection, the wireless modem connects to a PC through the serial port.

Using a built-in radio transceiver rather than phone lines as the route for delivery makes a significant difference in the applications for the Model 84. As anyone who has ever listened to a car radio while driving cross-country can testify, ground-based radio signals do not cover large distances reliably. True even when the signals are driven by a transmitter capable of broadcasting at tens of thousands of watts, it is that much more true with the Model 84, which has a

THE AIRWAVES

a wireless

modem links units via FM radio

connection costs and opening up new applications

transmitter rated at 1 lonely watt.

The maximum range of any radio transmitter or receiver depends a great

deal on the antenna system it's attached to. EST sells four different antennas for the Model 84, giving a large bracket for the "maximum" range of the modem.

The smallest and least expensive choice is a 9-inch whip antenna that mounts on the back of the modem. The whip antenna gives the radio a claimed line-of-sight range of about half a mile. The largest and most expensive choice is a building-mount antenna, with a claimed line-of-sight range of 30 miles. In between these two extremes are a smaller building-mount antenna and a magnetic-mount antenna, each of which has a claimed line-of-sight range of about 3 miles.

According to EST, the magnetic-mount antenna, at \$46.95, is usually the best choice. This antenna is designed to go on top of a file cabinet or on a car *dash* for portable operation. Its claimed 3-mile range takes into account the electromagnetic effects of the metal base that the antenna is presumed to rest on.

Notice that in each case the claimed range for the modem is based on line of sight, with no obstruction from antenna to antenna. The transceivers in the ESTeem modems operate in the VHF or Very High Frequency band—about 72 megahertz (MHz), or just above the frequency for channels 2, 3, and 4 on U.S. television.

Since the modem uses this 72-MHz



ESTeem WIRELESS MODEM

frequency, physical obstructions have about the same effect on the Model 84's radio signals as they have on TV transmission. The actual range for the modem therefore depends on such variables as the local terrain, the height of the antenna, and the number of buildings in the immediate vicinity.

By any measure, the Model 84 has a limited range, which puts it out of the running for transmitting files from, say, a branch office in Des Moines to a company headquarters in New York. But then, that's not the sort of application that this modem is meant for.

The short range begins to make sense when you use several Model 84s to form a local area network—it's about right for linking different offices in the same building, different buildings in the same industrial park, or nearby buildings within a given area of a city.

How It Works

The Model 84's networking capability rests mostly on its built-in smarts: sophisticated firmware and a Z-8300 central processing unit (the CMOS version of the venerable Z-80).

The modem's firmware lets you assign each modem an address: a number between 1 and 254. You can then call any other modem in the network simply by telling your modem to connect to a given address. The modem listens to make sure the frequency is clear, then sends out a connect signal. Every modem in the network—meaning every modem that is turned on and set to that frequency—will hear the signal, but only the model with the appropriate address will respond. An obvious problem here is that if all the modems in the network are using the same frequency, no more than one modem should be transmitting at once. Otherwise, each modem will jam the others.

The Model 84 gets around this problem with packet transmission. Instead of transmitting continuously, like a TV or radio stations does, each modem saves up information in packets, then transmits those packets in short bursts that typically last

less than one second. Between bursts the modem is quiet, the frequency is clear, and other modems are free to send their own packets.

Since each modem listens before sending to make sure that the frequency is clear, there is relatively little chance that the modems will jam each other, accord-

but apparently it's enough. I can only take EST's word for it, since the company understandably did not provide 254 units for review. It did provide 2 units, however.

The Hands-on Test

Setting up the Model 84 is straightforward and only slightly different from setting

up a standard telephone modem. As I've already mentioned, the modem connects to the PC through the serial port, just like any other external modem. Another familiar note for modem users is the bank of DIP switches for setting options.

The communications options on the Model 84 include settings for bits per second, parity, and number of stop bits. These come preset from the factory at 9,600 bps, no parity, and one stop bit and can generally be left alone. Should you need to change them, however, you'll find the DIP switches on the back panel of the unit—a big improvement over most standard modems, which typically put the DIP switches inside the box where you can't get at them without taking the modem apart.

In addition to DIP switches for the RS-232 settings, the Model 84 includes two banks of DIP switches for controlling the radio side of communications. These switches are also on the back of the unit, labeled TX Freq and RX Freq. As the labels suggest, these DIP switches primarily control the frequency of transmission (Tx) and reception (Rx).

The only complication in setting these switches is that for any given frequency, the DIP switch pattern for transmitter and receiver is different. You have to be careful to find the desired frequency on two separate charts in the manual and set the DIP switches accordingly.

The Model 84 uses 24 channels on the commercial radio band (from 72 to 73 MHz), each one 0.04 MHz apart. Since the modem can be set to any of the channels, up to 24 unrelated networks can coexist in the same immediate area without interfering with one another. As of this writing, the few Model 84s in use make the



EST uses radio transmission instead of phone lines.

ing to EST. Even so, a built-in error-checking feature guards against this and other sources of interference.

For each packet sent, the transmitting modem waits to hear an acknowledgement of error-free transmission from the other side. If it doesn't hear one, it waits a random amount of time and sends the packet again. The randomness of the delay ensures that two modems that had jammed each other once are unlikely to jam each other a second time.

According to an EST spokesman, as many as eight or ten links can be actively transferring files on one frequency before response time becomes noticeably slow. Eight or ten fully active links out of a possible 127 links may not seem like much,

New!
Look Up!

For the Right Command

**Software Reference Guides — Right Above your PC:
When You Want to Find Any Command Just LookUp!**

Every LookUp includes all these reference guides:

Ashton Tate
dBase II,III
Friday
Framework
Information Unlimited
Easywriter II
Lifetime
Volkswriter

Lotus Development
Lotus 1-2-3
Symphony
MicroPro
WordStar
Mailmerge
DataStar
CalcStar

Microsoft
DOS 2.0
BASIC
Multiplan
Word
Microsoft
Crosstalk XVI

Peachtree
Peachtree 5000
Software Publishing
pfs:File
pfs:Graph
pfs:Write
pfs:Report
pfs:Access

Softword Systems
Multimate
Sorcim
SuperCalc
SuperWriter
Thom EMI
Perfect Writer
Perfect Calc

VisiCorp
Visicalc
Communications
CompuServe
The Source
PC Talk III

Special Introductory Price \$29.90
Buy more than one for \$25.00 each

Check the list. LookUp includes complete command summaries for more than 30 popular programs. You get them all! You can eliminate time wasted searching for commands, slash computer induced frustration; and unlock the full potential of your Personal Computer - with LookUp!

Save Your Valuable Time

You don't have to stop to hunt through those cryptic pages of documentation. You don't have to memorize long lists of precise command formats. No more manual shuffling. All you do is — LookUp! Right atop your monitor (held firmly with velcro pads) is your personal computer "crib sheet." LookUp lets you operate at full speed, all the time.

Eliminate Computer Induced Frustration

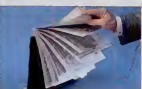
No more infuriating battles with personal memory problems. Put an end to distracting command searches. Keep your desk clear and uncluttered. You'll have a complete library of commands for all your programs - without messing up your desk. Glance up to a complete reference source that gives you the exact format of any command - without ever lifting a finger.

At-A-Glance Convenience

You'll wonder how you ever got along without LookUp. Command summaries are logically categorized so you can locate that missing command instantly. Handy index tabs let you select the appropriate guide quickly. LookUp's sturdy plastic easel supports a rugged three ring binder. Velcro mounting allows you to mount it wherever it's convenient.

Unlock Your System's Hidden Potential

Do you really use all of the commands of your favorite software package? Aren't there a lot of commands that you don't use because you can't quite remember the exact format necessary? Since it's never worth rummaging through those manuals, you just get along without them. But with LookUp above your monitor, all those commands are just a glance away.



Every LookUp includes a rugged plastic display easel and over 30 reference guides.

Introductory Trial Offer

We're so sure that you'll find LookUp invaluable that we're offering it at a special introductory price - and with an unconditional return policy so you can try it without any risk. Read this extraordinary Guarantee:

If at any time over the next year you decide you can get along without LookUp, send it back for a 100% refund ... No questions asked.

You've got absolutely nothing to lose. The price is reasonable. There are no hidden costs for shipping or handling. And it's easy to order. Just call our toll-free number anytime (800-772-1234), or return the enclosed coupon.

Look Up!

P.O. Box 34003
Omaha, NE 68134
(702)329-3581

Convenient three-ring format



Organized reference guides

Rugged plastic display easel

Velcro mounting pad

Handy index tabs

Look Up!

These prices include shipping — Call 800-772-1234 any time — Dealer and corporate inquiries noted.

☐ Send me one for \$29.90
☐ Send me _____ for only \$25.00 each

Name _____ Shipping address _____ City _____ State _____ Zip _____

Amount _____ Card# _____ Name on Card _____ Exp. Date _____

Payment VISA MC Bankcheck Check (only for C.O.D.s)

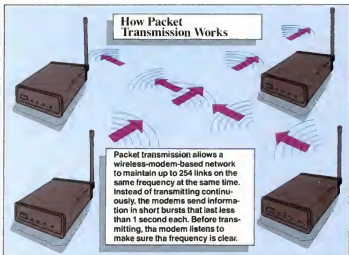
Send to: **Look Up!**
P.O. Box 34003
Omaha, NE 68134

ESTeem WIRELESS MODEM

odds of accidentally tuning into someone else's network long indeed. Should you run into any kind of interference, however, it's nice to know that you can usually eliminate it simply by changing the frequency for your network.

Another reason for changing frequencies might be to sidestep a temporary network overload. If it's taking longer to transfer a file than it should, you and the recipient can simply switch to an unoccupied frequency, send the file, then switch back to the network frequency for normal operation.

Other sources of interference are possible but unlikely. According to EST, the only other devices using this frequency are remote-controlled construction cranes. Before you conjure up images of a nearby crane receiving your directions and smashing through your office window, rest assured that—at least according to EST—this is impossible. If the Model 84 and the



Q

What do you get when you cross a Database Manager with Artificial Intelligence and a Word Processor?

crane are on the same channel, they can jam each other, but the crane will not respond to the Model 84's packet radio transmissions.

A far more likely source of interference is your own computer. As you probably know, particularly if you've tried tuning on a TV set near your system, computers are an excellent source of low-level radio frequency interference. In my tests, using the 9-inch whip antenna that EST supplied, this PC-generated interference proved to be a minor but real problem.

With the DIP switches for transmitter, receiver, and RS-232 port set in the proper position and the RS-232 cable, antenna, and power cable plugged into their connectors on the back of the unit, the Model 84 is ready to go.

A three-position rocker switch on the front of the modem acts as both an on/off and a reset switch. Turn the modem on, and a red LED power light comes on to tell

you that the modem is working. Two other status lights indicate when the modem's radio is receiving or transmitting. A fourth, and last, status light flashes on and off when the modem is in test mode.

Before you can use the modem, you have to set its address—and the address of at least one other modem in the network so you have someone to call. This setting is easy enough, thanks to the modem's built-in smarts.

As you might suppose, the Model 84 acts pretty much like any other intelligent modem from the computer's point of view. In particular, you have to load a communications program so that you can talk to the modem through the serial port. I used the *PC-TALK III* program in my tests, but the modem will work just as well with *CROSSTALK XVI* in its local mode, or with any other communications program that will allow you to type commands directly to a modem.

As I mentioned, the Model 84 as shipped is set to talk on the serial port at 9,600 bps. Before you can do anything, you have to set your communications program to the same speed. And, of course, you have to make sure that the settings for stop bits and parity match as well.

If your communications program is set correctly and is in terminal mode when you turn the modem on or reset it, the first thing you'll see is the modem's sign-on message. This message gives the modem's current address setting, among other things. You can use the address as is, or change it by entering the address command at the keyboard. (ADD 1 changes the address to 1, ADD 2 changes the address to 2, and so forth.) Once set, the modem will save the new address (and most other firmware settings) in an on-board EEPROM. You only have to type SAVE, and the modem will remember its new settings until you change them.



AN INTELLIGENT DATABASE MANAGER.

Q&A is built around an intelligent assistant that understands questions and instructions put to it in your own words. Data can be changed or added simply by telling the assistant to do so.

Like this: "Change the rent of Jake Smith's house to \$1300.00."

The intelligent assistant also learns from your experience. So it's easy for you to tailor it to your personal vocabulary and style of working. You can even give it a name it will remember and respond to.

Q&A has plenty of headroom. It handles fast, flexible indexing, macros, and can be customized using simple programming.

And import/export

capabilities for pfs:File* pfs:Write* 1-2-3, WordStar, MultiMate, and dBase II/III come standard.

AND A LIGHTNING-FAST WORD PROCESSOR.

You need more than just database capabilities, so we built an extremely quick and powerful word processing package into Q&A.

It's RAM-based for speed, handles up to 80 pages, and allows larger documents to be linked for printing.

Integrated with Q&A's intelligent database, it offers outstanding

mail merge features. And it supports all the most popular printers. Even laser printers.

Q&A opens the door to a whole new way of managing data. A process we call What-Is analysis.

What is What-Is?

The answer to that question is on the next page. But if you're already sold on Q&A, call 1-800-556-1234 x576 (1-800-441-2345 x576 in CA) for complete information on how to get it.

Introducing Q&A® software by Symantec. The first and only practical application of advanced artificial intelligence techniques.

All data management software has the ability to organize, store and manipulate data.

But only Q&A has the intelligence to do it with questions and instructions in real English.

Like: "What are the monthly rents of all houses with pools?"



CIRCLE 249 ON READER SERVICE CARD

ESTeem WIRELESS MODEM

Calling one modem from the other is a simple matter of giving the connect command followed by the address number. CONN 1 calls the modem set to address 1, CONN 2 calls the modem set to address 2, and so forth.

I came across three minor problems at this point. First, with the RS-232 port set to 9,600 bps, the Model 84 modem's sign-on message was slightly garbled, having two or three incorrect characters. This garbling was consistent in the sense that it happened every time I reset the modem, but inconsistent in the sense that a different two or three characters were garbled each time.

According to EST, the garbling was caused by "slight inconsistencies" in the clock speed between the Model 84 and the PC AT it was connected to. EST suggested resetting the RS-232 connection to 4,800 bps. I did, and the problem disappeared.

Fortunately, this adjustment doesn't af-

fect the overall speed of communications, since the radio link is always set to 2,400 bps. The 2,400-bps speed limit grows out of bandwidth restrictions imposed by FCC regulations, making it less a technical limitation than a legal one. But either way it acts as a bottleneck, so that the overall system works at 2,400 bps no matter how fast the RS-232 connection is set for.

The second minor problem relates to



ESTeem Model 84 Wireless Modem

Electronic Systems Technology

1031 N. Kellogg

Kennewick, WA 98336

(509) 735-9092

List Price: modem, \$895.95; shielded RS-232 cable, \$39.95; whip antenna, \$19.95; magnetic mount antenna, \$46.95; outside building mount antenna (1/2 wave), \$69.95; outside building mount antenna (1/4 wave), \$90.95

Requires: RS-232 port.

CIRCLE 608 ON READER SERVICE CARD

the RS-232 cable connecting modem to computer. Most computer equipment comes with a warning to use shielded cables to connect the equipment. But that's mostly to prevent radio frequency interference that originates with the equipment and radiates out from the cable.

The transmission from the Model 84 modem, however, is strong enough to cause radio frequency interference to the computer system itself. In particular, the interference can garble the very data going to and from the modem through an unshielded cable. The moral here is that with the Model 84, you must use a shielded cable to connect the unit to your PC—no ifs, ands, or buts. EST will sell you one for \$39.95.

The third, and final, minor problem is one I touched on earlier—radio frequency interference from the computer affecting the modem. The most obvious place to put the Model 84 modem is somewhere near



What is What-Is?

Data Encryption for Wireless Transmission

The process of converting data to the packets used in radio transmission has a number of built-in safeguards to discourage eavesdropping.

How secure is wireless networking? According to EST, there isn't anything to be concerned about. The packet radio scheme keeps the danger of electronic eavesdropping to a minimum.

A potential eavesdropper can't listen in on transmissions from the ESTeem Model 84 modem with an ordinary radio receiver. Not only does the packet radio scheme send information in short bursts of less than one second each, but the data itself goes through two levels of encryption before being transmitted as a packet.

Even if the eavesdropper has an ESTeem modem, listening in on the conver-

sation is no easy task. He or she must know the frequency your modem is set to and the modem's address. Given 24 channels with 254 addresses on each, there are 6,096 possibilities.

If the eavesdropper knows both the frequency and address of your modem, he or she can receive information in parallel with your modem. But the eavesdropper will still miss anything your modem sends, unless the eavesdropper has a second modem which is similarly set to the proper frequency and address for the modem you're talking to. What's more, according to EST, the second modem

must be set to the proper address and frequency at the moment the first packet is sent from your modem. Once the link is established, it's too late. And in a worst-case situation, you could thwart an eavesdropper with two modems set up in advance by changing the frequency.

Finally, EST will soon offer an optional built-in data encryption capability. According to EST, this feature will follow the requirements laid down by the National Bureau of Standards for encryption of data. The data encryption option is expected to be available early this year.—M. David Stone



And it's only available in Q&A* software by Symantec.

**IT'S A WAY TO ASK
YOUR DATABASE
QUESTIONS. IN YOUR
OWN WORDS.**

With Q&A, finding out What-Is in a database is as simple as asking a simple question.

Like: "Which condos rent for less than \$1000.00?"

Using information in the database, Q&A's intelligent assistant will make the necessary calculations and respond with a list of condos that satisfy the criteria. Instantly.

And if that answer suggests another question, all you have to do is ask.

"Which of them have microwaves?"

That's practical intelligence.

**IT'S AN INTELLIGENT
ASSISTANT WHO HELPS
GET THINGS DONE.**

Q&A's intelligent assistant can get all kinds of things done. Fast.

It can find and organize information. Even make changes in the database.

For example, tell the assistant to "Increase all security deposits by 25%," and it will be done. Throughout the database.

There are no commands to memorize. And you can teach the assistant to respond to you individually.

Naturally.

Other databases boast about their power. But power without intelligence is power wasted.

Q: What do you call software that gets smarter as you use it?

A: Q&A.

For more answers about Q&A, turn the page. Or call 1-800-856-1234 x576 (1-800-441-2345 x576 in CA) for complete information on what else What-Is is.



CIRCLE 250 ON READER SERVICE CARD

your computer. I tend to put modems on top of my system unit, next to the monitor. This practical arrangement doesn't sit well with the Model 84 modem. The radio signal generated by the computer is just strong enough that the modem receiver locks on to it. At that point, the modem thinks it's connected and refuses to respond to another modem.

According to EST, this interference is only a problem with the 9-inch antenna, and only because it is connected directly to the back of the modem, so that it winds up too close to the computer. Even with the 9-inch antenna, I was able to sidestep the problem, although it took some doing.

Two of the DIP switches located on the back of the modem function as a squelch control to let you set the level of receiver sensitivity. High sensitivity gives maximum range, but also increases sensitivity to interference. Conversely, low sensitivity can cut down on interference, but un-

fortunately cuts down on range.

On one of the computers I used in testing the modems, I was able to eliminate interference from the computer by setting the squelch control for low sensitivity. With the other system, I also had to move the modem as far from the computer as possible, and, finally, play with the antenna orientation (an activity familiar to anyone who has used an indoor "rabbit ear" antenna with a TV set). Apparently, none of this fiddling is necessary with the other antennas for the unit.

With these minor problems out of the way, the Model 84s worked just the way they should. Each one can call the other to transfer files or type information back and forth from the keyboard.

The modems also have a few cute tricks built in. Probably the nicest is that you can set the modem so that it will automatically connect to one other specific modem in the network whenever you send information

out the PC's RS-232 port. This feature lets an executive, for example, automatically connect to his or her secretary without having to enter the modem address each time. Alternatively, each of several modems can be set to automatically connect to a printer.

Another trick worth noting is a global connect command. Tell your modem to connect to address 255, and you can send the same message to everyone on the network at the same time.

Some Applications

With only two modems for review, I had no way to really test out an ESTeem-based network. For example, I did not get to see such messages as "Destination connected to another node"—the Model 84's version of a busy signal. Still, it's worth noting some of the system's special applications and limitations.

The modem has already been used for such operations as tracking the salt content



What do you
call software
that
gets smarter
as you use it?

in the Roanoke river for Weyerhaeuser Corp. The modem, plus terminal and sensing equipment, is set up at a remote site at the river and regularly relays information back to the Weyerhaeuser plant. According to EST, the cost of laying a cable would ordinarily rule out remote automatic sensing in this instance.

Another unusual application is at Shields Corp. in Yakima, Washington. Shields Corp. puts a Model 84 modem plus a terminal on each of ten forklift trucks in the Shields warehouse. This system lets each of the forklifts be continually "on the go, at maximum efficiency," receiving orders on the spot, no matter where they are in the warehouse.

On a less exotic note, the ESTeem modems should work just as well in the office, connecting PC to PC or PC to peripheral. At \$995.95 per modem—plus antenna, plus shielded cable—the cost per node is not cheap, but as EST points out, there is

no extra expense for wiring.

One obvious concern with the Model 84 is the low apparent level of security for the information while it is shuttled around by radio. But according to EST, that's not really a problem (see sidebar, "Data Encryption for Wireless Transmission").

There is at least one important limitation, however, that you should be aware of. The ESTeem-based network is limited strictly to real-time communication. If you want to send a file or a message to someone else on the system, you can't do it unless that person is ready. If the other modem is off or busy, you won't be able to connect. Worse, if the modem is on but the computer is doing something else, you can successfully connect to the other modem without actually getting through to the computer system itself.

The "real-time" aspect of the Model 84 becomes particularly bothersome when dealing with something like a shared print-

er. Since the modem on the printer can only talk to one other modem at a time, and since there is no memory buffer on the modem, you have to catch the printer when it's free. If you set the system up with a shared printer, you should probably add a memory buffer between the printer and the modem to allow some queuing of files for printing.

By any reasonable measure, the Model 84 offers an interesting and potentially useful approach for a local area network, particularly where cabling is a problem. What's more, using the ESTeem modems seems easy and straightforward. And this ease is despite a preliminary manual that is in the process of being redone. If the idea of a wireless network interests you, the ESTeem Model 84 Wireless Modems are worth a close look. ■

M. David Stone is a contributor to PC Magazine specializing in telecommunications.



You'll find that that capability is worth a lot to you. No matter what you use it for. Stock market analysis. Inventory. Employee data. Ticker files. Phone logs. Mailing lists. Anywhere you need fast access to stored data.

CALL IT EASY TO BUY.

At \$299, we believe Q&A offers more value per dollar than any other software product on the market.

But we haven't stopped there.

We've come up with a way for you to get some value out of whatever database or word processing package you're currently using.

If you make the switch from another program to Q&A, we'll give you \$50 off the purchase price. See your dealer for details.

And we'll give a 30-day money-back guarantee.

Q&A™ is built around an intelligent assistant that's smart enough to learn from your experience.

So you can teach it to respond to your needs to a degree no other software can match.

CALL IT THE BEST DEAL IN MEMORY.

We have an inexpensive way for you to take advantage of Q&A's intelligence and upgrade your hardware at the same time.

For a limited time, we're offering a half-length 256K memory board with Q&A. It's worth \$200 on the street, comes with a 12 month warranty, and when you buy Q&A, it's yours for just \$80.

If Q&A is beginning to sound like a

good investment to you, a quick demo should convince you.

Go to your local Q&A dealer and ask for one.

For more information on Q&A and What-Is analysis, call 1-800-856-1234 x576 (1-800-441-2345 x 576 in CA).

We think you'll be glad you did.

Call it a hunch.



CIRCLE 251 ON READER SERVICE CARD

Multiple Host Sessions—Up To 7 Combinations of Displays and Printers—Simultaneously (Available Only On AST-525/11 Plus)



Multiple Printer Sessions, Including 5256, 5224 and 5225 Emulation On PC-attached Printer

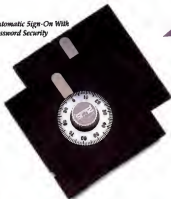
Programmable Printer Format Configuration



Bidirectional File Transfer



Automatic Sign-On With Password Security



Display Attribute Configuration

Now! Compatible With IBM® PC Support/36 Watch For Support/38

Build Your Smart Office The Smart Connection™ For

Loaded with the sophisticated features you need, we've just made our original AST-525/11 even easier to use and more efficient for increased user productivity, and introduced an enhanced version too—AST-525/11 Plus. Now you have lots of new reasons to make AST "The Smart Connection" for your evolving smart office.

Office Smarts—We've Got Them. At AST we've been building solutions for IBM® PC connectivity—the foundations of smart offices everywhere—long before it was a popular concept. You might say, with the over one million AST PC enhancements installed, over 20,000 PC to System 34/36/38 connections and the thousands and thousands of PC to IBM mainframe and local area

network gateway connections we've established worldwide, that we've already made a substantial commitment to helping people realize their fundamental visions of the "smart office."

AST-525/11—The Direct PC To 34/36/38 Connection. Standard twinax cable, just like IBM's, makes this connection the most convenient for you. Our Hot-Key support provides a toggle between PC DOS and two host sessions. And our new enhanced version, AST-525/11 Plus, even allows up to seven System 34/36/38 sessions—all concurrently.

AST's family of smart connections are strategically focused and developed to support and evolve in concert with the IBM Smart Office architecture. Highlighting the mini-computer group here, AST also addresses connectivity in mainframe and personal workstation environments.

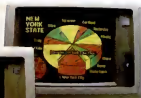


Our file transfer system means you can move host data to and from your favorite PC application software files, like Lotus 1-2-3®, WordStar® and dBASE®. For easy integration of PC and host applications, we've included our Applications Program Interface (API).

Add all our features illustrated above—everything from bidirectional file transfer to automatic 34/36/38 sign-on with password security, multiple printer support including 5256, 5224 and 5225, snapshot display storage, keyboard mapping help, and a full line of companion products—and AST-525/11 really spells smart for you.

AST-5250/Display™—Model 11 Attributes and Standard IBM PC Monochrome Display Capabilities. Used with your AST-525/11 card, the AST-5250/Display makes your PC's

AST-5250/Display
Products For Full Model 11
Display Attributes And PC
Compatible Graphics



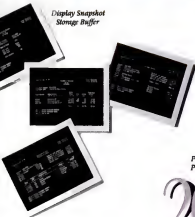
User Definable
Keyboard Mapping



Displayable Keyboard Map
of Program Control Keys



Display Snapshot
Storage Buffer



Proven In More Than 20,000 Direct And Remote
PC to System 34/36/38 Connections Worldwide

20,000

Even More Features

- AST-5251/11 Plus or AST-5251/11**
- Plugs into PC XT AT and compatibles, connects to System 34/36/38 via twisted cable and supports cable drive
 - Emulates 5251-11, 5250 or 5250-1 display terminal
 - Upgrade kit for AST-5251/11 to AST-5251/11 Plus
 - Selectable DMA and I/O interrupt channels
 - Applications Program Interface (API) included
 - Supports hard or hard disk
 - Host key assist for concurrent PC and multiple host sessions
 - IBM TSI compatibility for virtual disk support on the System 34/36/38
 - Third Party Software support, including ASTLink by Iverson, Laguna Laboratories' DecemLink™ and The BIOS™ by Tevlon Systems
 - Complete package includes hardware, software, system cable assembly & user manuals
- AST-5250 Display**
- Used with AST-5251/11 brings full IBM 5251 Model 12 character set and text display attributes to your IBM monochrome display
 - Provides standard IBM PC &

- IBM 5251/11 remote host display capabilities & a parallel printer port
- Heracles compatible high-res bit-mapped graphics & overlays
 - Automatically switches from 5251/11 display to PC display mode without operator interaction
- AST-5250 Display-C**
- Used with AST-5251/11 brings IBM 5252 Model 1 display attributes to your PC's color display
 - Provides compatibility with IBM PC Color Graphics Adapter with full-spectrum color capabilities
 - Includes parallel port
 - Automatically switches from 5252 Model 1 display to PC display mode without operator interaction
- AST-5251/12**
- A full solution for remote PC XT/AT compatible or compatible to System 34/36/38 communications in SNA environments
 - PC emulation for IBM 5251 Model 12 terminal
 - Host-attachable 5256 printer support on PC, host printer
 - Applications Program Interface (API) allows integration between host and PC applications
 - Includes hardware, software and comprehensive user documentation

On AST-5251/11: Your PC to System 34/36/38

monochrome display look just like an IBM Model 11 display.

And it gives you high-resolution Hercules™ compatible bit-mapped graphics, high quality text and a parallel port.

Now PC 5251/11 emulation is even easier for you because you're working with a screen identical to IBM's. And you can take advantage of the graphics capabilities offered by today's software.

AST-5250/Display-C™-IBM 5252 Color Attributes and Standard IBM PC Color Graphics Too. Use this card with your AST-5251/11 and your IBM color monitor for all of IBM's 5252 screen text attributes. And

some really colorful PC graphics.

Our color capabilities are completely compatible with your PC software favorites like Framework™, Symphony™, Lotus 1-2-3™, Business Graphics Systems™ and DESQview™. There's also a parallel port to make printer and plotter connection easy and convenient.

AST-5251/12™-Remote PC to 34/36/38 Connections. For remote communications in SNA/SDLC environments, this complete hardware/software package lets you use your PC as a remote 5251 Model 12 terminal, and your attached PC printer is host-addressable to emulate a 5256 printer. Our Applications Program Interface also makes

Integrating host and PC applications easy.

You can count on The Smart Connection—from AST—today and in the future. See your dealer, or call our Customer Information Center (714) 863-1333 for more information. AST Research, Inc., 2121 Alton Avenue, Irvine, CA 92714 (714) 863-1333 TWX: 753699 ASTR UR.

**AST
RESEARCH INC.**



AST-5251/11, AST-5251/11 Plus, The Smart Connection, AST-5250/Display, AST-5250/Display-C and AST-5251/12 trademarks of AST Research, Inc. IBM registered trademark of International Business Machines Corp. VisiDisplay registered trademark of Microplus International Ltd. Hercules registered trademark of Lotus Development Corp. DESQ and Framework trademarks of Ashton-Tate. Hercules trademarks of Hercules Computer Technology. Patent registered trademark of Pacesetter International. DecemLink trademark of Laguna Laboratories, Inc. The BIOS registered trademark of Tevlon Systems, Inc. Business Graphics Systems trademark of Pacesetter Software, Inc. 5252/256 registered trademark of Quarterdeck Office Systems. AST-5251/12 is a product developed by AST Research, Inc. and Software Systems, Inc. of Jefferson City, MO, and is protected under U.S. Copyright Law.

CIRCLE 104 ON READER SERVICE CARD

Save

1-800-231-9842
WESTERN REGIONAL ORDERS



- Low Low Prices
- No Surcharge for MasterCard and VISA

1-800-237-4048
EASTERN REGIONAL ORDERS

These Fine Corporations, Universities and Companies Put Their Trust In "COMPUTER MART"

ATT
3M
Magnavox
Eaton
Merrill Lynch

American Savings
Landmark Mortgage
American Nurse Assoc.
Dun & Bradstreet
U.S. Navy - Army

University of:
California
Illinois
New York
Colorado State

Put Your Trust In COMPUTER MART

• COMPUTERS •

IBM ENHANCED AT	4928
IBM ENTRY LEVEL AT	3241
IBM PC, 1 DSDD DR, 256K	1702
IBM PC, 2 DSDD DR, 256K	1826
IBM PC, NO DRIVES, 64K	1316
IBM PC, 2 HALF/HYTE	1702
256K	
IBM XT, 1DSDD DR/10MB,	3355
256K	
IBM XT, 1DSDD DR/TA HD,	2491
256K	2173
COMPAQ 2 DSDD, 256K	
COMPAQ PORTABLE 2	5292
MODEL 2	
COMPAQ DESK PRO	3304
MODEL 3	
COMPAQ DESKPRO	2156
MODEL 2	

• MONITORS •

AMDEK 300G	119
AMDEK 300A	153
AMDEK 310A	149
AMDEK 600 RGB COLOR	409
AMDEK 710 SUPER HI RES	
COLOR	447
IBM COLOR	616
IBM MONOCHROME	235
PRINCETON MAX-12 E	160
PRINCETON HX-12 RG	
COLOR	446
PRINCETON SR-12	575
PRINCETON HX-12E	
COLOR	510
QUADRAM AMBER-	
CHROME	171
QUADRAM QUADCHROME	
II	426
AMDEK 722	510

• DISPLAY CARDS •

STB SUPER HI RES 400	402
HERCULES COLOR	151
IBM MONOCHROME	218
IBM COLOR	226
EVEREX GRAPHICS EDGE	297
EVEREX THE EDGE	243
GENOA SPECTRUM	289
TECMAR GRAPHICS	
MASTER	459
PARADISE MODULAR	
GRAPHICS	274

• BOARDS •

AST SIX PACK PLUS, 64K	223
AST MEGAPLUS, 64K	205
AST MP-2, 64K	228
AST ADVANTAGE, 128K	384
AST I/O PLUS	122
JRAM 2	156
QUADRAM QUADBOARD	
0K	186
QUADSPRINT	423
TECMAR CAPTAIN, 0K	162
TECMAR FIRST MATE, 0K	200
TECMAR WAVE XT, 64K	187
TECMAR JR CAPTAIN,	
128K	295

• MODEMS •

HAYES 2400	627
HAYES 300	138
HAYES 300/1200	407
HAYES 1200B	
w/ SOFTWARE	346
HAYES 1200B	351
VEN-TEL HALF CARD	374
VEN-TEL 300/1200	
INTERNAL	341

AST REACH HALF CARD	
1200	363

• PRINTERS •

OKIDATA 83A, WIDE	
CARRIAGE	545
OKIDATA 84P, WIDE	
CARRIAGE	660
OKIDATA 92P	392
OKIDATA 93P, WIDE	
CARRIAGE	597
OKIDATA 2410P	1782
OKIDATA 182	215
OKIDATA 192	376
OKIDATA 182S	259
OKIDATA 184	660
EPSON FX-80 TRACTOR	371
EPSON LX-80	255
EPSON FX-185, WIDE	
CARRIAGE	515
EPSON FX-100, WIDE	
CARRIAGE	531
EPSON JX 80 COLOR	
PRINTER	531
EPSON LQ-1500	
PARALLEL	1002
NEC 2050	694
NEC 3550	1058
NEC 8850	1478
JIUKI 6300	698
JIUKI 6200	503

• ACCESSORIES •

NEC BI-DIRECTIONAL	
TRACTOR	151
NEC CUT SHEET GUIDE	63
JIUKI 6100 BI-DIRECTION	
TRACTOR	105
JIUKI 6300 BI-DIRECTION	
TRACTOR	122
MEMORY, 65K CHIPS	8
MEMORY, 256K CHIPS	39
PRINTER CABLE	10
MICROFASER BUFFER, 8K	131
BERNOULLI, 2 DRIVE	2615
BERNOULLI, 1 DRIVE	1790

Save



COMPUTER MART

1901 S. TAMiami TRAIL, VENICE, FL 33595
2820 W. CHARLESTON, LAS VEGAS, NV 89102

Call for non-advertised and lower current prices. IBM is a registered trademark of International Business Machines. Prices subject to change. We accept all major credit cards money orders, and personal checks. 7% surcharge for shipping, handling and COD shipments, and purchase orders \$100 minimum. Returns are subject to a 15% restocking fee. All sales final.
IN FLORIDA CALL 813-493-2736
IN NEVADA CALL 702-877-3968

Creating CORPORATE Training COURSEWARE

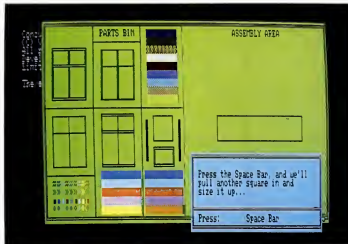
Two course-authoring programs from VASCO and McGraw-Hill make it possible, if not easy, for corporate trainers to create sophisticated PC-based courses and software tutorials.

The PC is becoming an increasingly important and cost-effective tool for companies in training employees to master any number of subjects and skills—especially, of course, use of the PC itself. Creating a PC-based tutorial or interactive course no longer requires extensive programming knowledge. Authoring systems that help nonprogrammers create courseware have been making their way from the classroom to the conference room in the last few years.

Authoring programs can simply help you present information, or you can use them to take learners on a sophisticated, interactive guided tour of anything from 1-2-3 to the national debt. While most spreadsheet or word processing users will have little need for a sophisticated authoring system, corporate trainers, training consultants, and educators can benefit from the power of these systems.

While programmers have been creating customized computer-based courses for years, they often suffered from a big disadvantage—lack of expertise in the course's subject matter. The advantage of authoring systems is that you interact with them in English so that nonprogrammers with expertise can create sophisticated presentations. Although these systems don't require you to be a programmer, they do require a substantial time investment to learn, and some require a substantial financial investment as well.

Two authoring systems worth exploring are the *VASCO Concurrent Authoring System* and the *McGraw-Hill Interactive Authoring System*. The VASCO program, which runs interactively and concurrently with other applications in the MS-DOS environment, is basically suited to teaching software programs. The McGraw-Hill program is a heavyweight that can teach any subject; it can do everything from cre-



With the tools in CAS's Parts Bin, you can create graphics to illustrate your courseware as well as pop-up windows containing instructions to the trainee.

ating presentation-quality graphs to offering multiple-choice tests and sophisticated branching scenarios.

Concurrent Authoring System

The *VASCO Concurrent Authoring System (CAS)* is a special-purpose program that lets you teach a software application while actually running the application—an advantage over systems that offer trainees only a simulation. While CAS is less sophisticated than the complex McGraw-Hill offering, its multitasking abilities exact stiffer system requirements: It needs a color display adapter, a color monitor, and at least 512K bytes of memory. The system will actually run with less than 512K bytes of memory, but it is extremely cumbersome that way. Trainees who merely want to run the courseware using the runtime module can get by with less memory (depending upon the application the course is teaching); 256K is the recommended RAM for trainees.

Setting up the non-copy-protected CAS is straightforward, and the documentation walks you through the steps quite easily. You copy all system files to your hard disk (or other destination drive), rename four "template" files (to serve as working files for your lessons), and then load the three

CAS programs. The memory-resident KERN program allows CAS and DOS programs to interact; you won't need to deal with it. EDCAS, the editor, also memory resident, is toggled on and off the screen with the hyphen key. The runtime program, which you copy into the course disk for each trainee, actually runs the training session. It directs the screen windows and interprets the trainee's input. You toggle the runtime program on and off with the plus sign key. The advantage of having 512K bytes of RAM really comes into play with the runtime program. With less memory, you can use the product, but you must exit and reboot if you want to see how well your programs are running. With 512K, you can create a session, run it, and edit it simultaneously without exiting the editor and loading runtime.

You are now ready to create a course—almost. You also need a subject program, the subject of your training, such as *1-2-3*, or *WordStar*. You load this subject program, bring it to the point at which you want to begin instruction, and begin.

Using CAS

Before you begin, it's helpful to understand some of CAS's terminology. What you will create is a series of *events*, which

are essentially on-screen *dialogues* between you and the trainee. You create a scenario in a window that will pop up on-screen, and the trainee either simply views the window (which might say, "This demonstration will teach you how to use DOS") or performs some action in response to a prompt (for example, "Type DIR and hit Return").

To begin, you press the F1 key, which brings up the main editing menu in a box on the right side of the screen. The editor offers the most-common functions you will use while editing events, such as save event, recall event, locate window, border window, create brackets, and delete event. It allows you to open a window of any size

Authoring programs can take learners on a sophisticated, interactive guided tour of anything from 1-2-3 to the national debt.

and color and place it anywhere on the screen. You type the information you want for your first event into the window, change the background and foreground colors if you like, and choose the type of border.

Your tools include a "pointer" that lets you easily highlight important information in a screen of the subject application. For example, if you want to point out the result of a spreadsheet calculation for a lesson, you choose the pointing function (by moving the cursor bar in the editing menu to Point and hitting Return), move the screen cursor to the place you want to point to, and hit Enter to create an arrow. Then, using the cursor keys, you can stretch this ar-



VASCO Concurrent Authoring System, Release 1.2
VASCO Corp.

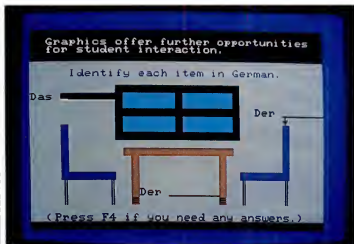
1919 S. Highland Ave., Suite 118-C
Lombard, IL 60148
(312) 495-0755

List Price: \$5,500 (perpetual license fee)

Requires: 512K RAM, two disk drives, DOS 2.0 or later.

CIRCLE 657 ON READER SERVICE CARD

CREATING COURSEWARE



The McGraw-Hill IAS lets you teach any subject using matching, fill-in-the-blanks, multiple choice, and problem-solving exercises.

row away from the starting spot and hit Enter again to end the sequence.

You determine how the trainee will interact with the tutorial using control windows. Each event has both a visible window (what the trainee sees) and a control window (which you input). You use the control window to manipulate what characters or sequences the trainee may enter, how the event will handle the input, and how the tutorial may branch at any given point depending on what the trainee enters.

CAS lets you enter fairly complicated string instructions and create different branching possibilities. The process sounds somewhat complicated, and it is. However, the program is logically designed, and once you have used it for a while, you'll find it much less arcane. Careful and precise planning and design of your application before you begin to implement it with CAS goes a long way toward avoiding headaches later on.

While CAS is relatively—and I stress relatively—easy to learn, you will need to invest a good many hours to become proficient and create a sophisticated training program. My time investment was considerable even to create a simple five-event scenario that interactively taught some basic DOS functions.

CAS's main drawback is, oddly enough, its documentation. The program could use a more sophisticated computer-based instruction program for itself. Although the on-screen demos (including an interactive demo of a tutorial for *Microsoft Word*) are fun to work through and demonstrate the program's capabilities comprehensively, they aren't much good at showing you how to use the more advanced CAS procedures. And the written documentation, which also could have benefited from a few simple examples, includes such classic phrases as: "Type a vertical strip of character 176 on the display window (by holding down Alt and typing 176 on the number pad). The runtime program will recognize these characters and will trap the cursor in the strip." This is hardly the type of writing to inspire confidence in the less-than-intrepid reader.

Despite CAS's complexity, it is an excellent authoring program for training professionals. Its price/performance ratio is very good, and it lets you create extremely attractive training screens in less time than many competing systems. While it does have some limitations (it doesn't support interactive video development, for example, and can't easily create training programs that don't use a software application

as a subject), it performs its advertised functions admirably.

Once you have descended the learning curve, you will probably be happy with CAS's menu-driven design and shortcuts. The on-screen features (like a "Parts Bin" that helps you create graphics more easily) make the development of either interactive courses or self-running demos if not easy, at least easier.

Interactive Authoring System

The McGraw-Hill Interactive Authoring System (IAS) is a more powerful and sophisticated system than VASCO's, and the difference shows in every area. The documentation is more imposing, the

CAS lets you teach a software application while running the application—an advantage over systems that offer only a simulation.

number of features is immensely greater, and the price is steeper.

The IAS system lets you put together many more types of tutorials than CAS does. You can teach any subject—not just a software application—using matching, fill-in-the-blank, multiple-choice, and problem-solving exercises that branch to other lessons based on the trainee's response. You can also incorporate interactive videotape "experiences" into your courseware. The IAS concept is also a little more complicated. To let you create lessons and then "deliver" them to disks that the trainee can work with, the authoring system and the delivery system come on separate diskettes.



McGraw-Hill Interactive Authoring System, Release 3.1

McGraw-Hill Training Systems

674 Via de la Valle

Solana Beach, CA 92075

(619) 453-5000

List Price: \$995

Requires: 128K RAM, two disk drives, DOS 2.0 or later.

CIRCLE 656 ON READER SERVICE CARD

How does WordPerfect top 4.0? Extra credit.

WordPerfect 4.1 Performance Report

*A
+5 extra
points*

A lot of people have been saying a lot of good things about WordPerfect, lately. In fact, our 4.0 version has been called the industry standard for word processing.

Of course, our first reaction was smiles all around (and a celebration or two). Our second reaction? Back to work on WordPerfect. Not because it isn't already a great program. But because the one thing that has made WordPerfect a success is our commitment to constant improvement. Reaching for perfection.

The latest result of that commitment is WordPerfect 4.1. And with several new features, it scores more than a few extra points.

1. Thesaurus

With a built-in thesaurus, WordPerfect 4.1 lets you choose synonyms for any words in your document.

2. Split Screen

By splitting the screen

horizontally, you can view two documents at the same time. And editing either document or moving between the two windows is fast and easy.

3. Text Columns

Columns are displayed side-by-side on the screen. In addition to newspaper-style columns, WordPerfect 4.1 includes parallel columns, ideal for scripts.

4. Line Drawing

Horizontal and vertical lines can be drawn and configured to form boxes or other graphic applications. Many available line styles include single, double and asterisks.

5. Sort

WordPerfect 4.1 allows you to sort lines, paragraphs or merge files alphabetically.

Other new WordPerfect 4.1 features include an expanded spelling dictionary, improved

critical error handling, improved proportional spacing, three-level undelete, type-thru and more.

Learn the finer points of word processing. Get WordPerfect 4.1. For more information, call or write:

SSI Software
288 West Center Street
Orem, Utah 84057
Information: (801) 227-4020
Order Desk: 1-800-321-4566,
Toll-free



SSI Software
Reaching for perfection.

CREATING COURSEWARE

Somewhat surprisingly, the copy-protected *IAS* requires only 128K bytes of RAM to operate and doesn't require a color monitor, although color greatly enhances it. You can put it on a hard disk, but the process is nightmarishly difficult and inconvenient. Another notable point is that *IAS* doesn't run directly under DOS: It creates its own operating environment and doesn't allow you to use DOS utilities.

To load the system, you simply reboot the computer with the authoring system disk in your A: drive. A main menu will appear offering four choices: create and edit lessons, verify lessons, system management, and video management.

You would first choose to create and edit a lesson. *IAS* requires that you assign each screen a name and a type: presentation, multiple choice, matching, fill-in-the-blank, or application simulation. You then fill in the lesson display options that you want, such as borders, colors, or display formats. Now you can simply enter the text you want, and when done press the F3 key to bring up another screen for saving or editing.

Although this procedure is relatively simple, building multiple-choice screens with course branches from each potential answer becomes increasingly complicated. The documentation and tutorial are fairly well done, but there are simply no shortcuts to working effectively with *IAS*. You simply have to spend a lot of time to learn all the features—and there are a lot of them.

IAS is a real powerhouse. It can create a formal course in any subject that the teacher can monitor. Each student's course disk records individual performance, which the master program can then analyze for time spent and specific areas of difficulty. The master program can display the results for an entire class in graph form. In fact, about the only thing you can't do with the *IAS* is precisely what you can do so well on the CAS system—run it concurrently and interactively with another application. While the McGraw-Hill system will let you branch to an application and capture application screens for display, you will still be building and running a simulation. *CAS*, on the other hand, lets you run the "real" application software, with controls you inserted using the authoring system. Al-

though both systems can be effective in teaching a program, *CAS* will let you build an effective software lesson in less time.

On most other counts, *IAS* has little to fault. Its inherent complexity is due to its myriad available options; considering the power of the program, it really isn't as complex as it might be. The system's creators have obviously tried to make it as easy to use as possible; they have done a fairly good job.

IAS is not exactly an intuitively operat-

McGraw-Hill's *IAS*
is a real powerhouse.
It can create a
formal course in any
subject that the
teacher can monitor.

ed program. But if you are a professional trainer, your time investment will be well-rewarded—you will have a large measure of control and flexibility with a sophisticated tool that will help you immeasurably.

To Train or Not to Train

VASCO's *CAS* and McGraw-Hill's *IAS* both offer training professionals attractive choices. If the focus of your work is designing software tutorials, *CAS* will most likely be your best bet. It offers a cost- and time-effective way to create on-line demos and tutorials that can run with "live" software.

If you want to teach any other subject and you need interactive video along with all the other bells and whistles available, look to the *IAS* package. It can cover virtually any subject you need of any situation you might encounter. Both packages perform well, and both will save you a lot of time over custom programming. Although they are not easy programs to learn, compared to other programs in their genre, they are relatively simple to work with. Either one can help authors of computer-based training scenarios to save time and money and to produce a polished, professional presentation. ■

Jon Pepper is a frequent contributor to PC Magazine.



IBM PC
256K, two disk drives,
360K each, drive
controller and
keyboard. Call for
prices on other
configurations.....CALL

IBM XT MODEL 068.....\$1829

EXPANDED QUADBOARD BY QUADRAM.....\$179

One parallel port, one
serial port, clock/cen-
tar, OK, memon, ex-
pansion to 384K,
game port, I/O bracket
and Quadmaster
software.
Silver Quad OK.....\$209



AST SIXPACK PLUS, 64K.....\$209

TANDON TM 100-2.....\$95
5 1/4" full height drive, DS
DD. Specially drive A or B.
Comes with step-by-step
installation instructions.



TANDON TM 65-2L.....\$185
Same as TM 100-2 but half height.

**OKIDATA ML192/P PRINTER WITH
OKIFONT SOFTWARE.....\$339**

160 CPS, 80 columns, all points
addressable graph-
ics, correspondence
quality printing
capability. Full IBM
PC compatibility.



OKIDATA ML193/P PRINTER.....\$485
Same as ML192/P but with wide carriage
and tractor.

EPSON FX85/FX185.....LOW

TURBO 20 HARD DISK.....\$575
20MB internal hard disk, three times faster
than XT, 13 months warranty. Controller
and cables included.

CALL
203-888-1867

**GEM
ELECTRONICS, INC.**

HOURS:
Mon.-Fri. 9 AM to 6 PM
24 Carriage Drive, Oxford, CT 06483

PRINTERS	
Citizen 10-20	\$309/439
Panasonic 1092/3151	\$389/429
H.P. Laser Jet	\$2339
NEC 2050/3550	\$679/1069
Quanta 20 with interface	\$429
Toshiba P1340/P351	\$459/1069

BOARDS & ACCESSORIES	
Texas 640 & Texas 555	\$685
Hayes Smartmodem 1200	\$385
Kensington Masterpiece	\$93
Orchid Turbo 186, 256K	\$645
PC Jr impulse, p. port, clock, OK	\$189
Ricore Drive 1/2 for PC Jr	\$439
Everex Magic Card II, OK	\$179
Imega Bernoulli Box, 20MB	\$2539
Tecmar Captain, OK	\$179
AI Compatible w/486, monitor	\$399
Sperdy PC, 2 drives, monitor	\$1799



COD No Surcharge. VISA & MC Add 3%

The SourceSM Is High-Powered.



In today's fast-paced business climate, it takes more than brains and drive to stay ahead of the pack.

Which is why so many people are turning to The Source.

The Source is the 24-hour online information and communication service you can access from any home or office PC. In a matter of seconds, it can update you on vital events of the day—both in and outside the business world.

With The Source, you'll be alerted to trends in the making. Kept posted on your competition. Given real-time stock quotes and performance reviews on thousands of publicly-held companies. And provided with the kind of edge that separates the leaders from the also-ran's.

The Source will help you speed communication to branch offices, clients, and

suppliers through electronic mail. And let you use computer conferencing to exchange ideas and manage key projects long distance.

But for all its high-powered advantages, The Source is also easy and economical to use. There's even a free tutorial to help you learn the ropes in record time.

To sign up today, call 1-800-336-3366. For more information, mail this coupon, or visit your nearest computer dealer.

And see how The Source can keep you on the fast track, too.



INFORMATION NETWORK The SourceSM

The most powerful resource any personal computer can have.

Please send more information about The Source.

Name _____

Address _____

City, State _____

Zip _____

Mail to: Source Telecomputing Corporation,
P.O. Box 1305, McLean, VA 22102. In Virginia,
or outside the U.S. call (703) 821-6666.

The Source is a service mark of Source Telecomputing Corporation, a subsidiary of The Reader's Digest Association, Inc. © 1985 Source Telecomputing Corporation.

NEW LOOKS FOR REPLACEMENT KEYBOARDS

Three new keyboards aim to diminish a perennial problem—how to key in data faster and with less fatigue. One has a trackball, one a touchpad, and one a startling layout.

M

ice are nibbling away at the need for a keyboard. Light pens hold a flicker of hope for folks looking for The Better Way. Yet data processing undoubtedly will keep users' fingers at work for ages to come. Despite the world's seemingly eternal commitment to it, though, today's computer keyboard is not perfect. Nor is it static. The keyboard has evolved from the oft-cursed initial PC and PCjr designs to the appealing refinements offered for the AT, and it continues to evolve. Every few months, it seems, a new design comes along to explore possibilities and make the humble keyboard a more useful tool.

The three keyboards examined here—the Wico Computer

Smartline SmartBoard, the KB 5153, and the Maltron Keyboard, type KIBM—aim at refining the efficiency of your fingers. Two of them, the Wico SmartBoard and Key Tronic's KB 5153, start by admitting that the traditional keyboard's individual keys serve admirably as exacting selectors of unambiguous characters, but each then looks in a different direction for better control.

The rationale behind these two key improvements is both scientific and pragmatic. Key presses are essentially one-dimensional,

The Wico Computer Smartline SmartBoard (upper right), the Key Tronic KB 5153 (lower right), and the Maltron Keyboard, type KIBM (left).



GRAPHWRITER

THE WORLD'S GREATEST LIBRARY OF
CHARTS AND GRAPHS.



GRAPHIC COMMUNICATIONS, INC.
200 Fifth Avenue
Wattham, Massachusetts 02254

CIRCLE 368 ON READER SERVICE CARD

REPLACEMENT KEYBOARDS

yet many computer operations require control in two or more dimensions. In a nutshell, it's easier to point than to peck out a command. Recognizing the usefulness of the computer mouse as a pointing and controlling device, these keyboards have incorporated similar control elements: the trackball and the touchpad.

On the other hand, the earnestly unique Maltron forces you to reevaluate the arbitrary layout most other keyboard makers have saddled you with, to the extent of abandoning the pre-Columbian flat world of keys that harks back to the first pipe organ keyboards. Maltron's goal seems to be to shock you into casting aside the prejudices of a hundred years and the millions of straight-rowed QWERTY keys and taking a fresh look at the problem at hand.

Wico Computer Smartline SmartBoard

One look cannot tell the whole story of the Wico SmartBoard. It appears to be a traditional QWERTY specimen into which the cue ball from a nearby pool table has become embedded; an ivory trackball sits to the right of its numeric/cursor keypad. However, under the SmartBoard's concert-grand complement of 88 keys lurks the brain of a complete computer.

Ordinary keyboards merely pick through the impulses of your fingers and push them into your PC. The SmartBoard



Wico Computer Smartline SmartBoard

Wico Corp.
6400 W. Gross Point Rd.
Niles, IL 60648
(312) 647-7500

List Price: \$329.95

CIRCLE 608 ON READER SERVICE CARD

KB 5153

Key Tronic Corp.
P.O. Box 14687
Spokane, WA 99214
(509) 928-8000

List Price \$399

CIRCLE 606 ON READER SERVICE CARD

Maltron Keyboard, type KIBM

PCD Maltron Ltd.
15 Orchard Lane
East Molesey, Surrey KT8 0BN
England
(Telephone) 01-398-3265

List Price: £295 (approx. \$415) plus £25 to ship to U.S. (approx. \$36).

CIRCLE 604 ON READER SERVICE CARD

PC MAGAZINE • JANUARY 14, 1986

processes your peckings as you go along, translating your every keystroke into new and wonderful key combinations before passing them along to your computer.

For instance, if the QWERTY layout slows you down, you can magically transform the SmartBoard into a Dvorak layout at the press of a single key. For more usefulness, you can turn the function keys into your favorite macros or make any key an instant abbreviation for your favorite, carefully crafted phrases. Six LEDs and the beeps of a small loudspeaker help you program its functions.

In addition, the SmartBoard will let blazingly fast typists dash far ahead of slow software. Its own internal 128-character buffer dwarfs the measly 15 for which IBM allocated space in the PC's memory.

The internal computing equipment of the SmartBoard is more sophisticated than you might expect: a 6802 microprocessor, 4K bytes of ROM, and 2K bytes of CMOS (Complementary Metal Oxide Semiconductor) RAM. The keyboard needs only a display screen to be a personal computer in itself.

Although the SmartBoard lacks a disk drive, it doesn't forget everything it's learned when you switch off the normal operating power it gets from your PC. Three AA batteries keep its memory alive, including all the key translations that you program into it, even when you turn off your computer.

In essence, the programmable functions of the SmartBoard are a hardware realization of programs like *ProKey* and *SmartKey*. Using hardware to create macros has the advantages of not stealing any of the microprocessor time or memory from your PC and not causing the incompatibilities and crashes that occur when single-minded programs tinker with the innermost secrets of your computer, altering interrupts for their own purposes.

The chief disadvantage of the SmartBoard's hardware key-translating scheme is that its otherwise clever design leaves but a scant amount of memory in which to store your keystrokes. For instance, the total number of characters that can be divided among the ten function keys is 252, with no more than 126 allowed for any one key. Another 128 characters are sliced off

FLAUNT IT.

If you've got the facts and figures, why hide them?

Get *Graphwriter*® and *Freelance*.™ They're graphics software packages for your IBM® PC or compatible. Nothing else brings out the facts and drives them home in such convincing fashion.

Graphwriter is the world's most powerful charting package. It gives you every chart and graph you need to keep your audiences on the edge of their seats. Everything from pie and Gantt charts to organization charts.

Freelance gives you all the rest. Useful symbols like telephones, stars and computers. The ability to customize charts you've made with *Graphwriter*, *Lotus*® 1-2-3® and *Symphony*®. Even the freedom to design your own original images.

Both *Graphwriter* and *Freelance* also do a dynamite job on word charts, which many packages leave out.

Best of all, *Graphwriter* and *Freelance* can work with each other. Together, they're all the presentation graphics software you'll ever need. Individually, they're the most powerful presentation graphics packages available today.

It all boils down to one thing: You're finally able to create a graphic demonstration that perfectly reflects your style, ideas and intuitions.

Next presentation, strut your stuff. Call for the full story on *Graphwriter* and *Freelance* now.

617-890-8778

CIRCLE 367 ON READER SERVICE CARD



REPLACEMENT KEYBOARDS

the 2K total RAM for the type-ahead buffer. ProKey and its clones are memory limited mainly by the amount of RAM you install in your computer, leaving you more than enough room to assign address blocks

and boilerplate paragraphs to certain key combinations. With the SmartBoard you'll run out of memory before you get to a half-dozen names and phrases.

Another SmartBoard feature, its BA-

SIC mode, is of dubious value to keyboarders of the IBM clan. Press a special key, appropriately labeled BASIC, and the SmartBoard switches into a new operating mode in which every letter key is automatically translated into uppercase and pressing Shift converts each alphabetic key-stroke into a BASIC key word—A for REM, B for RUN, and so on. You can, of course, get the same results with your clunky IBM keyboard merely by pressing CapsLock for uppercase and using the more mnemonic Alt-key combinations for your key words when you run BASIC.

The SmartBoard is smarter than you might think, however. Wico admits that many of its programmable features compete against similar functions built into the IBM PC. In the world of Apple computing, however, these features can be a god-send, and the SmartBoard knows how to communicate with Apples as well as PCs. Apple users need only an adapter to convert the SmartBoard to their computers and gain new programmability, the special BASIC functions, and the extended type-ahead buffer.

Making Tracks

The obviously unique feature of the SmartBoard, the attached trackball, is probably its greatest virtue for PC users. Essentially, a trackball is a Microsoft-style mouse turned upside down. Instead of racing the little rodent across your desktop, you roll the SmartBoard's cue ball in the direction you want the cursor on your PC screen to move. The SmartBoard circuitry translates the trackball motion into the IBM-equivalent cursor key presses.

The result is wonderful. With but a few minutes practice you can roll the cursor anywhere on the screen, quickly and painlessly. Slide a painting program into your drive slot, and you can draw nearly any figure quickly and accurately. No more mad stabs at cursor keys and curses when you accidentally fill your screen with numbers.

The trackball function of the SmartBoard is well thought out. While mice seem steeped in the philosophy that everyone needs to make the same size sweeping movement to elicit a certain course across the screen, the programmability of the SmartBoard allows you to customize your

ACCOUNTING FOR MICROS

\$395 Set of Four
\$325 Set of Three
\$465 Set of Five



ACCOUNTING FOR MICROS is a series of integrated accounting programs which meet professional standards. They're fast and easy to use, with complete instructions. Our manual (shown above) also includes helpful information on bookkeeping and computers.

GENERAL LEDGER **\$235**
Allows up to 1,000 accounts & 1,000 transactions/month. Retains month-end balances for Last year, This Year and Forecast. Includes Cash Disbursements, Cash Receipts and General Journals. Reports include Balance Sheet, Income Statement, Annual Summaries and Journal Reports.

ACCOUNTS RECEIVABLE **\$235**
Allows up to 2,400 customers and 1,000 invoices per month. Invoicing can access Inventory Module. Keeps customer names and addresses. Invoicing prints on plain paper or any pre-printed form. Statements can be printed at any time.

INVENTORY **\$235**
Allows up to 4,000 parts. Keeps 3 month history of unit sales as well as year to date. With A/R, can be used as point of sale system (prints invoices, handles cash). Reports include Inventory Value and Stock Report, Internal and Customer Price List.

ACCOUNTS PAYABLE **\$235**
Allows up to 500 vendors and 1,000 invoices. Records incoming and hand-written checks. Prints computer checks on any pre-printed forms. Keeps vendor names and addresses.

PAYROLL **\$235**
Will handle up to 100 employees with eight deductions per employee. Deductions may be determined as fixed dollar amounts or percentages, or referred to a table for automatic look-up. Tax tables are easily entered, or purchased separately. Prints checks and W2's.

SET OF FIVE **\$465**
SET OF FOUR **\$395**
SET OF THREE **\$325**

RUN ON MOST CP/M AND MS/DOS

Apple II/III	IBM PC AT/XT	Sharp Z80
Commodore	Kaypro III	Sony 68000
Genie	Minicom 101	Toshiba 101 or 102
Omni	Osborne 101	Wang 720 C
Exxon 101	Panasoft	Wang 720 C
Exxon 101	Radio Shack CPM	Other compatibles

DEMO DISK
\$18.00



Try all 5 programs above SGL, AR, AP, IN, PTO. Order our DEMO Disk for \$18.00 (includes shipping). Continued versions of the programs give you the "best" of data entry and reports. Includes sample reports and instructions. Specify machine.

THAN **\$235**
The "Catch-All" program. Files any type of information for quick access. Name or subject oriented with 15 lines of notes per name. Use THAN as a mailing list, filing system, notebook, etc. Can be used alone or with data from our other programs.

THAN DEMO **\$18**

HOW TO ORDER: Please specify machine and disk format. You can pay by check, by VISA or MasterCard (we need your expiration date and card number), or by U.S. C.O.D. (add \$2.50 C.O.D. charge). Our price includes shipping. Minnesota residents, add 6% sales tax. We ship most orders the same day.

ORDER BY PHONE: 612-339-2521

James River Group
CORPORATION



Dept. PC
125 North First Street
Minneapolis, MN 55401

(612)339-2521

trackball strokes to your own aesthetic judgments. If you're a neophyte to ball rolling, you can make the cursor dance slowly across the screen as you spin the magic white globe. If you're impatient, you can program performance that will make your head spin.

The actual ritual of programming the SmartBoard is a bit unnatural. Customizing SmartBoard functions and making key assignments depend on pressing certain keys, watching the flashing LEDs, and spinning the trackball. After a few days experimenting with the SmartBoard, however, you'll probably settle on a few favored programming combinations and will never need to deal with the arcane ritual again.

Even as an ordinary keyboard, the SmartBoard is quite competent. Its feel is light and positive, though not as precise as that of the official IBM product. It's both quiet and quick, with audible feedback from an internal loudspeaker that can be switched off by toggling one lever in a hidden DIP switch bank. These switches also allow you to defeat the type-ahead buffer or the typematic (automatic key repeating) feature and to choose whether you get two or four axes of control with the trackball.

Key Tronic KB 5153

For years Key Tronic has been in quest of the ultimate keyboard. In fact, the company has produced several "ultimates," each one incorporating every imaginable design feature. Although the imaginations of PC users keep growing, redefining the concept of what is ultimate, the KB 5153 brings to life what many PC people would consider an ultimate keyboard design.

The KB 5153 starts with an AT-style layout, an arrangement more favorable to typists than that of the PC original. Essentially the KB 5153 boasts the Selectric typewriter's key array—with a great big Return key that the most errant pinkie swing can't miss and the interlocking characters removed from between the alphabet and the Shift keys—complete with an almost-IBM-standard, spliced-on numeric/cursor keypad and an extra endowment of computer control keys. The ten normal function keys and a few extras have been moved to the top row, so that they can directly correspond to on-screen images some programs project. A touchpad bal-

ances out the keyboard's right-hand side.

Perhaps best known in the guise of a drawing tablet, a touchpad is nothing more than a tactile sensor, a plastic sheet that lets your PC detect exactly where you've

placed your fingertip or a stylus on it. In the hands of a good software engineer, the touchpad can become virtually any sort of input device: a keypad, a mouse, or a drawing tablet. Key Tronic imbues the

Finally!! A tax program worth having . . .

TurboTax

Personal Version 1986, 3.0

Check These Features!!

- ✓ FAST—3 seconds for complete return (No Kidding!)
- ✓ Easy to use—windows, pop-up menus
- ✓ "Very easy to use . . . Documentation—Excellent" — PC Magazine
- ✓ Over 30 forms
- ✓ Built-in tax planning module, includes 1986 tax rates
- ✓ Full depreciation support
- ✓ IRS approved
- ✓ Automatic supporting schedules
- ✓ Our quick-look tax window
- ✓ Override any calculation
- ✓ Rapid changes from form to form
- ✓ Record keeping
- ✓ Terrific display in color or monochrome
- ✓ Operates like a spreadsheet—only easier!!
- ✓ 4-function calculator mode built-in
- ✓ Prints entire return with your personal printer
- ✓ Simply the best at any price!

Only \$65

\$55 + \$5 shipping/handling. Calif. residents add 6% sales tax. VISA/MC accepted. Integrated state returns available for many states—Only \$30

TAX PREPARERS:

Ask about our new professional package: TurboTax Professional: 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852,

The personal computer that raised high performance to new heights.

If you work with high volumes of information,
you need answers fast.

You need a personal computer that's up to the task.

Which is why IBM created the Personal Computer AT® system. It's changed a lot of ideas about business computing.

The idea of "fast" has become much faster. The idea of "data capacity" has become far greater.

There are new definitions of "power" in a stand-alone PC. While phrases like "sharing files" and "multi-user systems" are being heard more often.

And surprisingly, words like "affordable" and "state-of-the-art" are being used *together*.

Clearly, the Personal Computer AT is different from anything that came before. And what sets it apart can be neatly summed up in two words.

Advanced Technology.

If you've ever used a personal computer before, you'll notice the advances right away.

To begin with, the Personal Computer AT is extraordinarily fast. That's something you'll appreciate every time you recalculate a spreadsheet. Or search through a data base.

It can store mountains of information—literally thousands of pages' worth—with a single "hard file" (fixed disk). And now you can customize your system to store up to

30,000 pages with the addition of a *second* hard file.

The Personal Computer AT runs many of the thousands of programs written for the IBM PC family. Like IBM's TopView, the program that lets you run and "window" several other programs at once.

Perhaps best of all, it works well with both the IBM PC and PC/XT. Which is welcome news if you've already made an investment in computers.

You can connect a Personal Computer AT to the IBM PC Network, to share files, printers and other peripherals with other IBM PCs.

You can also use a Personal Computer AT as the centerpiece of a three-user system, with your existing IBM PCs as workstations.

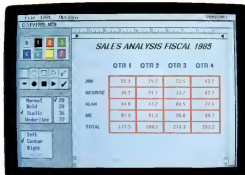
Most important, only the Personal Computer AT offers these capabilities *and* IBM's commitment to quality, service and support. (A combination that can't be cloned.)

If you'd like to learn more about the IBM Personal Computer AT, see your Authorized IBM PC Dealer, IBM Product Center or IBM marketing representative. For a store near you, call 1-800-447-4700 (in Alaska, call 1-800-447-0890).

The IBM Personal Computer AT, for Advanced Technology.



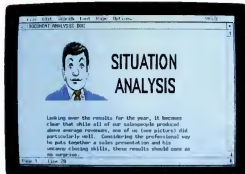
How to chart, graph, write, draw, or paint yourself into a corner office.



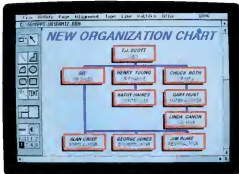
GEM WORDCHART™ (NEW): Create text presentation forms and slides quickly and easily. A variety of type styles and sizes. Up to 8 colors. Plus built-in bullets, borders and table layouts. Price: \$149.



GEM GRAPH™ (NEW): Powerful, easy-to-use graphing program. Create column, bar, line, symbol and map graphs. Built-in symbols and maps. Automatic 3-D and "pretty" functions give graphs professional polish. Price: \$249.



GEM COLLECTION™: Put words and pictures together in your reports and proposals. Words from GEM WRITE™, a fast, powerful word processor based on *Wolkriter® Deluxe* by *Lifetree Software, Inc.* Pictures, titles and diagrams from GEM PAINT™. Price: \$199.



GEM DRAW™: Now anybody can design layouts, charts, logos and more. Includes a wide variety of line styles, colors, type sizes and fill patterns. Built-in rectangles, circles, arcs and polygons. Plus an extensive library of ready-to-use art. Price: \$249.

Screen color available only with IBM Enhanced Graphics Adaptor and supported color monitor. Color output requires supported color output device. GEM, GEM COLLECTION, GEM DESKTOP, GEM DRAW, GEM GRAPH, GEM PAINT, GEM WRITE and GEM WORDCHART are trademarks and Digital Research is a registered trademark of Digital Research Inc. Other computer or software names are trademarks and/or tradenames of their respective manufacturers. Copyright © 1985 Digital Research Inc. All Rights Reserved.



This is what a career looks like when you present it with GEM™ software.

You see, with GEM you can put together a bold presentation of your bright ideas almost as fast as you can think them.

So, assuming you have a fair share of bright ideas, all you need now is a PC. And one or more of the GEM programs in this ad. Each of them works alone. Or they all work together.

Say, for instance, you're writing a report with GEM COLLECTION. You can use GEM GRAPH to add a telling graph to your report. Or you can embellish a GEM WORDCHART presentation foil with

commands, you can spend your time getting ahead.

GEM software.

What better way to make your ideas perfectly clear? Or to clear a career path?

To place an order, or for the name of your GEM software dealer, call (800) 443-4200.

Charge your order to Visa, MasterCard or American Express.

Or mail this order form, along with your payment.



an illustration from GEM DRAW.

And so on.

GEM software works with IBM® PCs, XT's, AT's and compatibles with appropriate graphics capability. Plus most any output device you can name, including the new laser and ink jet printers.

What's more, GEM software is now available for Tandy's Model 1000, 1200 and 2000 computers.

But best of all, GEM lets you work quickly and easily with simple menus, icons, windows and a mouse (or other compatible pointing device).

So instead of getting lost in cryptic computer

Name _____

Address _____

City _____

State _____ Zip _____

Phone _____

___ GEM COLLECTION \$199.00 ___ GEM DRAW \$249.00

___ GEM GRAPH \$249.00 ___ GEM DESKTOP* \$ 49.95

___ GEM WORDCHART \$149.00

Add \$4.00 shipping and handling for each product ordered. Applicable sales or use tax will be added. COD, checks or purchase orders will not be accepted.

(Outside USA add \$30.00)

*GEM DESKTOP is included free with each GEM software product, or may be ordered separately as a stand-alone product.

Method of payment Circle one: VISA MASTERCARD AM. EX.

Card number _____

Exp. date _____

Signature _____

 **GEM**
FROM DIGITAL RESEARCH®

Mail to:
GEM Software
Digital Research Inc.
60 Garden Court
Monterey, CA 93942
Or call (800) 443-4200.

PC MAG 1/14

REPLACEMENT KEYBOARDS

touchpad of the KB 5153 with the ability to take on any of those identities.

Even as a lowly keypad, the KB 5153 touchpad has amazing versatility. It can function as a square matrix of 4, 9, 25, or

36 discrete function keys. Using the software supplied with the keyboard, you can define the exact keystroke equivalents of every press of a touchpad function key to suit your favorite applications or even

DOS. The program is easy to use, essentially menu driven with a great deal of on-line help. You just type in the keystrokes you want executed when you press the appropriate area of the touchpad. Key Tronic also supplies overlays, which are thin plastic sheets you place atop the touchpad, on which you can inscribe the function of each area. You can assign up to 70 characters to each touchpad function key, a total of 1,168 for the entire touchpad.

The Key Tronic software also allows you to fine-tune the touchpad response to suit your own fingers or stylus. You can control such details as axis smoothing (which, for instance, will help interpret your slightly off-base lines as perfect horizontals) and the speed of the repetition of each keystroke as you apply continuous pressure.

A Flat Mouse

The KB 5153 touchpad can also serve as a built-in mouse equivalent. The keyboard detects the movement of your finger or the stylus on its surface and generates equivalent mouselike commands. At its simplest, this flat mouse-style control lets you almost instantly position the cursor anywhere on your display screen, making editing in a word processor or BASIC a delight rather than drudgery.

With additional software, presumably supplied in conjunction with specific applications, the touchpad will work like a miniature drawing tablet. With many painting programs the additional software is unnecessary. The cursor commands from the mouse mode give sufficient control to keep drawing tolerable instead of tedious.

The touchpad is no mere add-on; it's an integrated part of a cleverly designed keyboard system in which great attention has been paid to detail. For instance, an extra top-row function key, labeled Touchpad, switches the touchpad between function key and mouse modes. Key Tronic has even solved a perplexing problem that often develops on PC keyboards with LED indicators on their Shift keys: the inevitable times that the Shift indicators get out of sync with the software being run. By pressing the Reset key and the ShiftLock key that is out of sync, you can switch the indication to correspond with reality.

Lattice® Works

NEW PROGRAMMER'S SCREEN EDITOR INTRODUCED

Designed specifically for programmers, the Lattice Screen Editor (LSE) is a fast and flexible, multi-window editor that is also easy to learn and use.

LSE runs under MS-DOS or PC-DOS on most popular machines with 128Kb memory. It provides standard editor functions such as block moves, pattern searches, and "cut and paste". In addition, LSE offers special features for programmers such as an error tracking mode and three assembly language input modes.

A complete installation program is included to remap any of LSE's 48 keyboard functions. Menus, prompts, help messages and default file extensions can also be customized for individual user preferences. \$125.00.

LATTICE TOPVIEW TOOLBASKET NOW AVAILABLE

Providing more than seventy functions, the Lattice TopView Toolbasket is designed for software developers writing applications for IBM's TopView multi-tasking, multi-window environment.

The Toolbasket functions eliminate the need for extensive use of assembly language when interfacing with TopView. The Toolbasket's library includes functions to control window, cursor, pointer, and printer operations. It also provides access to TopView's cut-and-paste facilities and offers debugging services.

The Toolbasket runs on the IBM PC, XT, AT, and compatible systems with 256Kb memory. \$250.00. Binary and source code is available for \$500.00.

LATTICE CREATES C COMPILER FOR COMMODORE AMIGA

Amiga C, produced by Lattice for the Commodore Amiga, supports the Amiga's 68000 microprocessor and offers the same high speed and extensive capabilities of the MS-DOS Lattice C compiler currently used by more than 30,000 software developers worldwide. Available from both Commodore and Lattice. \$300.00.

In addition, Lattice also offers cross compilers that allow you to develop Amiga programs on MS-DOS or UNIX systems.

Contact Lattice, to discuss your programming needs. Lattice provides C compilers and cross compilers for many environments including Tandy, Sony, Hewlett-Packard, Tandem, and IBM Mainframe. Corporate license agreements available.



Lattice

Phone (312) 858-7950 TWX 910-291-2190

INTERNATIONAL SALES OFFICES

Berkeley, De Vought, Phone (512) 720-91-28 England: Roundhill, Phone (0672) 54675

Japan: Lefebvre Inc. Phone (03) 293-4711 France: SFDL, Phone (1) 666 1155

CIRCLE 113 ON READER SERVICE CARD

The Key Tronic software for programming the functions of the KB 5153 does not tinker with any of the secret inner workings of your PC by intercepting keyboard commands as they are processed. (Thus it won't interfere with the operating of *ProKey*, *SmartKey*, *SideKick*, or any other program.) Rather, it alters the way the keyboard reacts to your keystrokes, changing the scan code that each key press sends to your computer.

The program downloads the configurations you design into the keyboard, which remembers them as long as your PC is turned on. The configurations must be loaded into the keyboard every time you turn your computer on, a job easily handled by your AUTOEXEC.BAT file.

Even as an ordinary keyboard, the KB 5153 would win high marks. Its light feel and positive but quiet action actually seem an improvement on the famed Key Tronic touch of previous models. Its capacitive design should ensure a long, trouble-free life. With the added touchpad, little room for improvement is apparent—for today at least.

Maltron Keyboard, type KIBM

The Maltron looks so different that it inspired the following insightful comments from the various editors who glimpsed it: "Did someone leave that out in the sun?" "Find that under the infrared heater in a restaurant?"

Indeed, the Maltron looks like it got too warm and began to melt. What should be a flat surface is warped into a pair of concave puddles of keycaps. *PC Magazine's* editor, Bill Machrone, best described it when he took one look and surmised, "It must be British."

He's right, but there's no Union Jack in sight—the Maltron is just so eccentric.

The central idea behind the Maltron is that the familiar QWERTY key arrangement worshipped in offices around the world is outmoded. Even the concept of four straight rows of keys has been rethought.

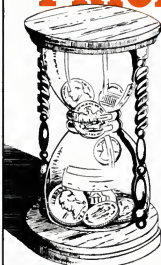
The Maltron is almost symmetrically arranged into right and left halves. Each half has a concave keypad devoted to four fingers and a separate thumb pad. The hands are segregated from each other by a numeric/cursor pad separated from the fin-

gerpads by a more-than-inch-wide gulf of bare plastic. A long row of function keys runs across the top.

The premise underlying the concave design is that fingers come in different

lengths. Your middle finger is longest, index and ring finger shorter, and pinkie shortest. Obviously, then (at least in the Maltron system of logic), the perfect keyboard arrangement should put the keys for

TIME IS PRICELESS.



But for \$99.95* you can.....Save it, track it, bill it, graph it, and report it with **timeslips™** from NORTH EDGE SOFTWARE CORP.

THE FIRST SOFTWARE PACKAGE THAT COMBINES EVERYTHING YOU NEED TO TRACK, BILL, GRAPH AND REPORT TIME.

IF TIME TRACKING IS IMPORTANT TO YOU—PHONE TIME, CONSULTING TIME, COMPUTER TIME...

ANY TIME—TIMESLIPS™ WILL DO IT!

- Pop-up or foreground operation of the timer module.
- Professional bill generation including non-time charges.
- Stopwatch timing of up to 16 operations at once.
- Powerful report generator analyzes time and productivity.
- Versatile export capabilities to spreadsheets and data bases.
- Generates bar and square pie charts without a graphics card.
- Merges Timeslips™ from other computers into a single report.
- Security with keyboard lock and password feature.
- Creates detailed time and activity reports for the IRS.
- Runs on IBM PC/XT/AT and true compatibles.

ORDER TODAY BY CALLING **TOLL FREE 1-800-225-5669**

VISA AND MC ACCEPTED

(ORDERS ONLY PLEASE)

FOR MORE INFORMATION CONTACT:
NORTH EDGE SOFTWARE CORP.
P.O. BOX 286, HAMILTON, MA 01936

* plus s/h

_____ north edge _____
_____ software _____
_____ corp _____

NOT COPY PROTECTED

If you *don't* have data worth preserving, then the reasons for buying Cartrex's new 1/4-inch, high performance, virtually error-free tape cartridge won't mean anything

But, if you are one of the many 1/4-inch tape cartridge users that assume 3M's cartridges just *have* to be "good enough" for today's high performance tape drives, read these simple facts to understand why that isn't true anymore.

PILOTS HAVE A SAYING, "There are those who have made a wheels-up landing—and those who will."

You can apply this expression to those who have lost data and those who will. Unfortunately, data loss isn't always because users haven't backed-up their hard disk. Sometimes it's because their 1/4-inch tape cartridge, where they back up their hard disk, developed hard errors—those insidious errors that tend to increase over time. That's why Cartrex has developed a 1/4-inch data cartridge for today's high performance drives that virtually eliminates errors.

Why a new cartridge

When 3M announced its cartridge in 1971, it was designed for a low capacity tape drive with less than 3 megabytes—2.88 to be exact. The tape was low in density—1600 bits per inch with only 4 tracks and 300 feet of tape.

The tolerances required for the tape drives of the early 1970's were fine for then, but today's tape drives require much tighter tolerance. Today's tape cartridges must work with drives that have 9 or more tracks and bit densities as high as 12,000 bits per inch on 600 feet of tape. That means capacity increases of 2,000 percent packed into the same cartridge.

The reasons that yesterday's cartridge technology simply won't work properly in today's high capacity drives is inherent in the cartridge design.



The new Cartrex 1/4-inch tape cartridge is the first new tape cartridge design in almost a decade and a half. Tape drive manufacturers now have a new cartridge technology which allows them to advance beyond this previous artificial barrier.

With the significant increases in capacity, the three culprits that make cartridge tolerances so important are fluctuating tape tension, redeposit nodules, and instantaneous speed variations (or ISV).

Tape Tension

Any child who has played with a magnet understands that as the magnet is separated from metal, the magnet's ability to work is decreased. So

it's no surprise to find out that the closer the tape drive head is to the tape, the better the reading. This closeness is particularly important when the embedded iron filings get packed tighter in today's high density tape.

It's also important with the increase in the number of tracks. After

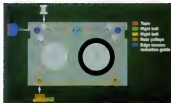
all, you wouldn't want the head to be reading an adjacent track any more than you'd want it reading more than one magnetic representation of a bit.

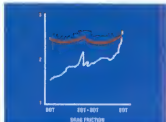
Unfortunately, tape tension historically has not been constant. As the tape unwound, the tension increased. What's important is both the amount and range of tension. A fluctuating increase or decrease in tension is as unacceptable as low tension is in the first place. As the accompanying graphs



The Cartrex cartridge design (upper left) uses the N2 principle which creates head-to-tape tension by applying a mechanical differential at the rear pulley between a stiff transport belt and a stiff tensioning belt, indicated in green and yellow in the color schematic (upper right).

The conventional 3M design applies drag at the rear pulley to create tension, which creates heat, and limits future speeds much above 90 inches per second.





Good head-to-tape tension ensures the highest probability of reliably capturing data. Fluctuating tape tension allows data loss due to head-to-tape separation and smearing redeposit nodules across the tape head. The Cartrex cartridge, compared to the conventional design, creates constant and higher tension.

show, the Cartrex cartridge has higher tension and flatter profile than the 3M cartridge. This means more reliable data across the entire tape.

Redeposit Nodules

Another reason to keep constant tension is to avoid "redeposit nodules" from smearing across your tape drive's head. What are redeposit nodules? They are the insidious flakes of tape media that break off from the edges of the tape and get dragged up to the edge of the tape head. If the tension is low, or becomes low when the tape starts or reverses, the flakes come up over the edge, get smeared over the head, and reduce its ability to read the data.

Even worse, however, is that these redeposit nodules are dragged along the surface of the tape and get embedded and packed over time. When your drive tries to read the data, the redeposit nodules act as a tent pole holding up the tape away from the head. As a result, even the best error-recognition algorithm can only tell you one thing—you've lost the data.

You might be wondering what causes the flaking in the first place. Again, it is cartridge design. The basic design uses a tape guide, shown in the accompanying illustration. The problem with this approach, is that it presupposes that the tape will always run parallel to the top and bottom caps of the tape guides. At the low speeds of

30 inches per second typical of when the 3M cartridge was designed, it was less of a problem. But at today's speeds of 90 inches per second and more, the tape wanders. When it presses against the top of the tape guide, the tape's edge pressure builds. Not only does media flake off, but you lose data due to the "coining" or "scallop" effect.

Cartrex eliminated the cause of the tape coining or scalloping by developing a barrel-shaped roller placed prior to the tape guide. The laws of physics show that by riding on a rounded barrel, the tape will always seek the middle, reducing the tape edge pressure. This seemingly simple addition causes the tape to always enter the tape guide with zero edge pressure. In this way, the possibility of media flaking off and creating redeposit nodules is virtually eliminated.

Instantaneous Speed Variation (ISV)

Instantaneous speed variations is exactly what it sounds like—small, instantaneous changes in tape speed as it crosses the tape head. At slow tape



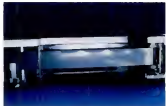
You can compare the Cartrex design on top with the conventional 3M design (lower left) and DEI, a 3M licensee (lower right). The omission of "edge tension reduction guides" (indicated in dark blue on the color schematic) on either the 3M or DEI design means that tape edge pressures will increase causing the magnetic media to flake off, smear across the tape head, and cause "redeposit nodules" to become embedded in the tape.

speeds and low bit densities—like the 1971 standard of 30 inches per second and 1,600 bits per inch—ISV wasn't as big a problem. At that time, the bits were crossing the head at 48,000 bits per second.

Today, however, the story has changed. 90 inches per second and 8,000 bits per inch mean that 720,000

bits cross the head every second. A 1,500% increase.

As you may have guessed, speed fluctuations in the 48,000 bits per second made reading data difficult for tape drive electronics. But when the electronics have to guess whether or not the bit rate of 720,000 bits per second is accurate, the electronics can become overwhelmed.



High speed tape without the "edge pressure reduction guide" seldom enters tape guides parallel to the top and bottom. The edge pressure which results creates "scallop" or "coining" on the tape. The effect is data loss due to head-to-tape separation, flaking media that smears across the head, and "redeposit nodules" that create hard errors.

Never a Single Issue

Your tape drive seldom has the luxury of dealing with an isolated problem. It's usually a combination of ISV, redeposit nodules, and tension problems all together. Now you understand why Cartrex wanted to develop a cartridge for a market that needed a modern alternative.

Where to get it

Not only has Cartrex improved on the industry's 15 year old technology, they have done it for a competitive price.

Now you can have peace of mind when you back up your hard disk on today's sophisticated tape drives.

And you can have it fast. Simply phone:

(619) 485-6603 EXT 100

and give Cartrex your credit card number and they will send your cartridges by return mail.



CARTREX CORPORATION
MARKETING
HEADQUARTERS

11590 WEST
BERNARD CT.
SUITE 230

SAN DIEGO
CALIFORNIA
92127

619-485-6603

CARTREX

CIRCLE 525 ON READER SERVICE CARD

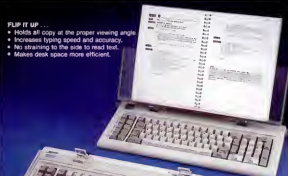
the CopyCover (Patented)

THE PERFECT COMBINATION — DUSTCOVER & COPYHOLDER

\$19.95

FLIP IT UP...

- Holds all copy at the proper viewing angle.
- Increases typing speed and accuracy.
- No straining to the side to read text.
- Makes desk space more efficient.



FLIP IT DOWN...

- Save money by protecting keyboard from harmful dust and dirt.
- Takes the place of traditional plastic "covers" that are unsightly to look at and difficult to hide.
- Quantity discounts.
- Dealer & OEM inquiries invited.

CLIPS ON AND OFF IBM PC, AT OR XT KEYBOARD IN SECONDS.
MANUFACTURED IN BEAUTIFUL CLEAR ACRYLIC

Send check or m.o. to C-THRU Products, Inc.
6351 Lake Worth Rd. Suite 111
Lake Worth, FL 33463 (305)439-4333

Add \$3 shipping and handling per unit. Florida residents add 5% tax.

C-THRU
PRODUCTS, INC.

CIRCLE 118 ON READER SERVICE CARD

What to do after you've tried banging on the PC and yelling 'I know you're in there.'

Let's face it. Human beings have a tendency to lose things. Socks. Car keys. Data. Losing your data has got to be the absolute worst. Time for



The Norton Utilities™ with UnErase™, a powerful file recovery tool that actually searches for and retrieves lost data. But sometimes files aren't altogether lost, just misplaced. The File Find utility will search your directories and display your file by name. Text Search will search for specific text if you can remember some identifying words of the file. Other utilities sort through your directories and

list them five different ways. You can also gauge file space, wipe files clean or protect your data from accidental deletion.

The Norton Utilities version 3.0 is designed for the IBM PC, PC-AT, and DOS compatibles. Available at Computerland and most software dealers. Order direct for \$99.95 from Peter Norton, 2210 Wilshire Boulevard, Santa Monica, CA 90403. 213-399-3948. Visa and Mastercard welcome.

THE NORTON UTILITIES
DATA RECOVERY
DISK MANAGEMENT



TIME-LIFE
ACCESS
NEWSLETTER
says "Highly
recommended for
business users."

VOLUME/SITE
LICENSES
AVAILABLE.

A life saver for your data.

CIRCLE 346 ON READER SERVICE CARD

REPLACEMENT KEYBOARDS

your middle finger farthest away, at the bottom of a concave bowl.

Such a theory is almost compelling, but my fingers just don't believe it. When I point my claws in the general direction of a keyboard—typewriter or harpsichord—they naturally take on an arc that would better fit a convex keypad. (Try it yourself.) The Maltron's concave curve made my fingers squeeze together, and its keys seem to be more closely spaced. In reality, the spacing approximates the spacing of a standard keyboard (about 1/4 inch from mid-key to mid-key).

The First QPYCB Keyboard?

If you're used to QWERTY, you're in for an even bigger surprise with the Maltron. The primary keycap legends bear no resemblance to your favorite arrangement, or to any other that you may have seen before, including Dvorak. The layout appears to be Maltron's own, an unpronounceable QPYCB. Like the Dvorak layout, it puts the most common keys in the home rows and divides the letters among the two fingerpads; for the most common key combinations, sequential presses use alternate hands.

Some experts believe that, once you've become proficient at it, a Dvorak-like key layout might improve your typing speed by 10 to 30 percent. But it took me 10 to 15 years to get competent at typing on the quirky QWERTY. In the time it would take me to relearn using the Dvorak layout or the Maltron keyboard, how many characters would I lose trying ultimately to gain 10 percent or so? Most people seem to agree that relearning to type with an alternate key arrangement does not make sense economically. (See the accompanying sidebar, "Learning the Maltron Keyboard," for a differing, first-hand account.)

Fortunately for QWERTY holdouts, an extra key electronically switches the character arrangement to an approximation of the familiar layout. The unusual shape of the keyboard makes even the familiar keys hard to find, but tiny QWERTY labels are tucked at the top of each keycap to help you hunt and peck along.

Even in QWERTY mode, however, you can only guess where you'll find little necessities like the spacebar and the Back-

Learning the Maltron Keyboard

The Maltron, a bizarre-looking British keyboard created by Lillian Malt, a typing theorist, and Stephan Hobday, an engineer, is a daring attempt to increase your keying speed and reduce your fatigue. The Maltron's dramatically different key placement is not likely to replace the familiar QWERTY any time soon (most of us resist relearning something we already know how to do), but I decided to give it a try.

The look of the keyboard is startling. The left- and right-hand key groups are a few inches apart. Why should keys controlled by the right hand and those controlled by the left hand be crowded together? Malt and Hobday reasoned. This crowding forces you to bend your wrists and tense your shoulders—a widely recognized source of fatigue.

Shallow concave pits hold keys for the four fingers of each hand, designed to accommodate the fact that our fingers are different lengths. Keys that are struck by the middle fingers are further away than those struck by the other fingers, for which the keys are also adjusted.

Then there's the thumb, relegated to spacing duty by most keyboards. The Maltron keyboard gives each thumb

eight keys in its own keypad. The thumb always hits the letter *e*, the most commonly used letter of the alphabet. Each thumb also gets a Ctrl and an Alt key. The left thumb strikes the Home and the up and left cursor keys, the ones that move you back through your work; the right thumb strikes the End and the down and right cursor keys, which take you forward. The symmetry aids learning and quickly becomes second nature.

Although you can use the Maltron in the QWERTY mode, the keyboard's own specially designed key placement arranges the most commonly used letters in the home key positions and assigns the keys so that the same finger hardly ever types two letters in succession, eliminating a major speed reducer.

Science Typographers, a Medford, New York, company that has used four Maltrons in a real-life production situation, found that a fast typist could exceed QWERTY speed on the Maltron by 12 percent after 6 months of using the keyboard. Other users quoted by the developers cite similar or better results.

To help new users adjust to the dramatically different key placement, Malt and Hobday supply typing courses with

the keyboard. To test their claims of more speed and less fatigue, I followed one. Here's what I found.

Since I'm a reasonably fast touch-typist on QWERTY, I tackled the short course. After about 10 hours of practice, I was up to 25 words a minute or so while copying from text. But my productivity depends on being able to compose at the keyboard without conscious effort. I'm still not to that point with the Maltron, but I can see it coming. Meanwhile, it's apparent to me (and to Science Typographers) that the other major benefit of the Maltron—less fatigue—is real.

The Maltron is decidedly not for everyone. Admittedly, relearning something as familiar as the QWERTY layout sounds crazy, but if, like me, you give the Maltron a try, you may be surprised at its versatility and payoffs over the long run. With its own unique key arrangement as well as its QWERTY layout, it's a revolutionary new instrument. Time will tell whether or not it becomes part of the PC's permanent repertoire.

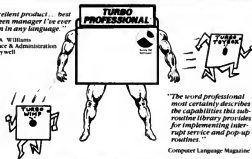
—John Helliwell

John Helliwell is a Toronto-based computer consultant and writer.

ATTENTION TURBO PASCAL PROGRAMMERS

"Excellent product... best screen manager I've ever seen in any language."

Don A. Williams
Finance & Administration
Honeywell



"The word professional most certainly describes the capabilities this sub-routine library provides for implementing interrupt service and pop-up routines."

CompuLink Magazine

TURBO PROFESSIONAL's easy to use routines let you... write safe, "sidekickable" routines that can use DOS • execute DOS commands from Turbo • create super-fast windowed displays • service interrupts without assembler • make your own keyboard enhancers • allocate memory from DOS • print concurrently with DOS 3.x.

Complete with 109 + routines, manual, source code to Super Macs keyboard enhancer, and many example programs.

Only \$49.95 + \$5.00 shipping & handling

Visa, MasterCard OK

Order now!

(206) 367-0650



Sunny Hill Software
13732 Midvale North Suite 206
Seattle, Washington 98133

Get the tools that have no competition.

Requires Turbo for compatibles Turbo Pascal & Sidekick Trademark Borland Int.

KODAK DISKETTES: Discover the future today!



**KODAK.
THE NAME
SAYS IT ALL.**

Take a Century of experience in coating products like photo film, add two brand-new state-of-the-art plants for manufacturing diskettes and you have something new: KODAK diskettes, a taste of the future.

Kodak spends more than three million dollars a day in research and development. They have more than 120,000 employees and manufacture and market more than 30,000 products.

**But George Eastman
said it best:**

George Eastman, the founder of Eastman Kodak and the man who made it possible for everyone to have a family album expressed Kodak's philosophy almost a century ago: make "good goods!"

That's why we're so pleased to add KODAK diskettes to our line.

**Great quality,
great value!**

For those of you who want a "brand name" diskette with top-of-the-line quality...without paying through the nose, the choice is simple: KODAK.

**Of course, there's a
LIFETIME WARRANTY!**

Except as noted, all KODAK diskettes are packed in boxes of ten with Tyvec sleeves, user ID labels and write-protect tabs. Bulk packed diskettes are labelled as KODAK diskettes and are packed in 4 bundles of 25 diskettes with Tyvec sleeves, user ID labels and write-protect tabs.

	Qty. 20-40	Qty. 60+	Qty. 100
5.25" SDD	\$1.11 ea.	\$1.01 ea.	
5.25" DSD	\$1.46 ea.	\$1.33 ea.	
5.25" DSD-HD	\$3.47 ea.	\$3.15 ea.	
3.5" KODAK DISKETTES			
3.50" SDD	\$2.06 ea.	\$1.87 ea.	
3.50" DSD	\$2.73 ea.	\$2.48 ea.	

**KODAK LABELLED
BULK DISKETTES**

5.25" SDD in package of 100	\$.93
5.25" DSD in package of 100	\$ 1.24

**FOR ORDERS ONLY:
1-800-821-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

DISK WORLD!, Inc.

629 Green Bay Road • Winnetka, Illinois 60091

**DISK
WORLD!**



FANTASTIC LOW PRICES ON

BASF QUALIMETRIC DISKETTES! LIFETIME WARRANTY!

Buy in bulk and save. 100 to the case with envelopes, write protect tabs and user ID labels. Boxed product is the same except in cardboard boxes of 10.

	Qty 50	Qty 150
5.25" SDD	\$3 ea.	\$2.68 ea.
5.25" DSD	\$4 ea.	\$3 ea.
5.25" DSD-HD	\$12 ea.	N/A
5.25" DSD 96TPI	\$4 ea.	N/A
5.25" DSD 96TPI	\$1 ea.	N/A
3.50 SDD 115TPI	\$1 ea.	\$1 ea.
3.50 DSD 115TPI	\$2 ea.	\$2 ea.

NOTE: 3.50" diskettes in Quantity 50 are packed in plastic library cases. That's why they seem to be a better buy. But there are only 5 diskettes to a case. So the bulk diskettes are really a better deal...unless you like expensive little library cases.

**FOR ORDERS ONLY:
1-800-621-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

**DISK
WORLD!** Media

DISK WORLD! Ordering & Shipping Instructions

Shipping: 1" & 3.5" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. **Other Rates:** Add shipping charges as shown in addition to other shipping charges. **Payment:** VISA and MASTER CARD accepted. **COD Orders:** Add additional \$5.00 Special Mail charge. **APD, FPO, HI & PR Orders:** include shipping charges as shown and additional 5% of total order amount to cover P&L and insurance. **Taxes:** Illinois residents only add 7% sales tax.

Prices subject to change without notice.
This ad supersedes all other ads.
Not responsible for typographical errors.
MINIMUM TOTAL ORDER: \$35.00

**FOR ORDERS ONLY:
1-800-621-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

DISK WORLD!, Inc.

629 Green Bay Road • Winnetka, Illinois 60091

**DISK
WORLD!**

ATHANA DISKETTES The great unknown!

60¢ ea. 5.25" SDD
Qty 50
74¢ ea. 5.25" DSD
Qty 50

You've used these diskettes hundreds of times as copy-protected originals on some of the most popular software packages. They're packed in poly-bags of 25 with Tyvec sleeves, reinforced hubs, user identification labels and write-protect tabs.

LIFETIME WARRANTY!
SOFT SECTOR ONLY! Sold in multiples of 50 only.

**FOR ORDERS ONLY:
1-800-621-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

DISK WORLD!, Inc.

629 Green Bay Road • Winnetka, Illinois 60091

**DISK
WORLD!** Authorized Distributor
ATHANA
MAGNETIC
MEDIA



Now, the lowest
prices ever on
3M diskettes.
LIFETIME WARRANTY!

All 3M diskettes are factory packed in boxes of 10 and come with Tyvec sleeves, user ID labels and write-protect tabs.

	Qty. 20-40	Qty. 50+
5.25" SDD	\$1.20 ea.	\$1.09 ea.
5.25" DSD	\$1.54 ea.	\$1.44 ea.
5.25" DSD 96TPI	\$2.18 ea.	\$1.98 ea.
5.25" DSD	\$2.73 ea.	\$2.48 ea.
5.25" DSD-HD	\$3.45 ea.	\$3.14 ea.
3.50" SDD	\$2.18 ea.	\$1.98 ea.
3.50" DSD	\$3.09 ea.	\$2.81 ea.

3M DATA CARTRIDGES

(Sold 10 to a carton only)

(Add \$5.00 shipping charges for cartridges!)

DC1000	\$12.43 ea.
DC1000LP	\$16.85 ea.
DC200A	\$20.30 ea.

**DISK
WORLD!** Authorized Distributor
Information Processing
Products **3M**

PRINTER RIBBONS:

**at
extraordinary
prices!**

Brand new ribbons manufactured to Original Equipment Manufacturer's specifications in housings. (Not re-wired or spools only.)

LIFETIME WARRANTY!

Epson MX-70/80	\$2.70 ea. + 25¢ Shpg.
Epson MX-100	\$4.08 ea. + 25¢ Shpg.
Okidata Micro83	\$1.37 ea. + 25¢ Shpg.
Okidata Micro84	\$2.98 ea. + 25¢ Shpg.

**FOR ORDER'S ONLY:
1-800-621-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

DISK WORLD!, Inc.

629 Green Bay Road • Winnetka, Illinois 60091

**DISK
WORLD!**

DISKETTE STORAGE CASES

**AMARAY MEDIA-MATE 50: A REVOLUTION
IN DISKETTE STORAGE**

Every once in a while, someone takes the simple and makes it elegant! This unit holds 50 5.25" diskettes, has grooves for easy stacking, inside implies to keep diskettes from slipping and several other features. We like it!

\$9.69 ea. Shpg.

DISKETTE 70 STORAGE: STILL A GREAT BUY.

Both free storage for 70 5.25" diskettes. Six dividers included. An excellent value.

DISK CADDIES \$9.95 ea. Shpg.

The original flip-up holder for 10 5.25" diskettes. Beige or grey only.

\$1.65 ea. Shpg.

**FOR ORDERS ONLY:
1-800-621-6827
(In Illinois: 1-312-256-7140)
HOURS: 8AM-5PM Central Time, Monday-Friday**

**WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES!**

DISK WORLD!, Inc.

629 Green Bay Road • Winnetka, Illinois 60091

**DISK
WORLD!** The value leader in
Computer supplies
and accessories.

What the world really needs is a 69 cent Double Sided, Double Density Diskette with a LIFETIME WARRANTY!

And DISK WORLD! has it.

**Introducing Super Star Diskettes:
the high quality diskette with
the lowest price
and the best LIFETIME WARRANTY!**

In the course of selling more than a million diskettes every month, we've learned something: higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette, no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality. The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits.

But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Trouble is, most of them aren't manufacturers. Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and passing their labels on the finished product.

The new IBM diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for U.S.A. Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices: without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications... specifications which are higher than most... and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.

FRAUD ALERT!

Please be careful!

A lot of the "no-name" diskettes flooding the market at prices of less than \$1.00 are what we in the industry call "floor sweepings."

In other words, they're garbage... stuff that six months ago, no self-respecting manufacturer would have sold.

But times got tough and some people's scruples got a little lost in desperation... and so a lot of computer users are getting some really bad disks... and that isn't bargain at all.

So, when the price seems too good to be true... like 39 cents, be careful... very careful!

HOURS:

Human: 8AM-4PM Central Time, Monday through Friday



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Truarc sleeves, reinforced hubs, user ID labels and write-protect tabs.

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes.

Instead, they concentrate their efforts on turning out the highest quality diskettes they can... because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them... and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work like any other, everytime. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

HOW TO ORDER:

ORDERS ONLY:
1-800-821-8827
(In Illinois: 1-312-255-7140)

INQUIRIES:
1-312-255-7140

FDR FASTEST SERVICE: USE ND-COST MCI MAIL. Our address is DISKORDER. It's a FREE MCI MAIL letter. No charge to you. (Upon permitting, we'll ship these orders in 24 hours or less.)

DISKPAIR, 5 1/4" & 3 1/2" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. OTHER ITEMS: Add shipping charges as shown in addition to other shipping charges. PAYMENT: VISA, MASTERCARD and Personal orders accepted. CASH ORDERS: Add additional \$5.00 special handling charge. APO, FPO, AK, HI & PR ORDERS: Include shipping charges as shown and additional 5% of total order amount to cover P&H and insurance. We ship only to United States addresses, except for those listed above. TAXES: Illinois residents, add 7% sales tax.

MINIMUM ORDER: \$35.00

Super Star Diskettes. You already know how good they are. Now you can buy them...cheep.

Well, that's the story.

Super Star diskettes don't roll off the boat from Pogo-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years... and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions.
And then we sell them to you
cheap.

When every little bit counts, it's Super Star Diskettes.

You've made them a hundred times, under different names.

Now, you can buy the real McCoy, the same diskette that major software publishers, computer manufacturers and diskette marketers buy... and call their own.
We simply charge less.

Super Special!

Store 75 diskettes for only \$5.95!

Yep, that's right: order 50 Super Star diskettes, add \$5.95 and we'll include a Media Products OSK MINOR II, a well-made unit that we're impressed with.

It holds 75 diskettes securely and locks nice too!



The Super Star LIFETIME WARRANTY!

Super Star Diskettes are unconditionally warranted against defects in original material and workmanship so long as owned by the original purchaser. Returns are simple: just send the defective diskettes with proof of purchase, postage-paid by you with a short explanation of the problem, and we'll send you the replacement. (Incidentally, coffee stained diskettes and diskettes with staples driven through them don't qualify as "defective".)

WE WILL MEET OR BEAT ANY NATIONALLY
ADVERTISED PRICE
ON THE SAME PRODUCTS AND QUANTITIES
SUBJECT TO THE SAME TERMS AND CONDITIONS.

**629 Green Bay Road
Wilmette, Illinois 60091**

DISK WORLD! INC.

REPLACEMENT KEYBOARDS

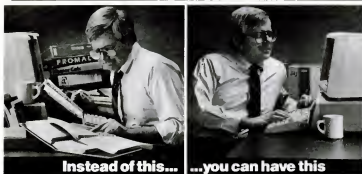
space and Enter keys. The Shift keys are reduced to small keys at the periphery of each four-finger keypad. The spacebar has become two inconvenient double-size keys, one on each thumb keypad. The En-

ter key is even less propitiously placed in the central keypad, across a sea of blank plastic from the nearest finger.

The curves of the Maltron design are made possible by individual hard contact

switches mounted directly onto the black plastic case (which has the feel of lightweight polypropylene). Keycaps are grey with large white Maltron lettering and tiny red QWERTY lettering. The function keys are yellow with black lettering.

I did not spend enough time typing on the Maltron to determine whether it would improve my speed in the long run. As the saying goes, you can't teach an old dog to change his spots. But in theory, if you're willing to commit yourself to an admittedly nonstandard, idiosyncratic design exercise, you may get more characters into your PC's memory faster using the Mal-



Instead of this... ...you can have this



\$14.95

Why waste time digging through cumbersome manuals for operating commands? PC-DocuMate™ templates put computer commands at your fingertips for the IBM® PC, PC-XT, PC-AT, AT&T, Compaq, and Apple® IIe.

You'll have quick reference for needed commands, options and formats right on your keyboard with a PC-DocuMate template.

Our professionally designed, two-sided templates are made of durable, non-glare plastic. Satisfaction is guaranteed—fully—or your money back.

Templates Now Available—
IBM PC/XT® and COMPAQ®:
DOS/BASIC (3.0 & 3.1) • 1-2-3 •
Symphony • dBASE II • dBASE III •
Framework • MultiMate •
WordStar • WordStar 2000 •
EasyWriter II • MULTIPLAN •
Peach Text 5000 • SUPER CALC •
TURBO PASCAL • WordPerfect •
VOLKSWRITER DELUXE •
Do-It-Yourself.

PC/AT®: DOS BASIC (3.0 & 3.1) •
dBASE III • 1-2-3 • WordStar
2000 • Symphony • WordPerfect •
MultiMate • Do-It-Yourself.
AT&T®: dBASE III • 1-2-3 •
WordStar 2000 • WordPerfect.
Apple IIe®: AppleWriter II •
WordStar • VisiCalc • dBASE II •
Quickfile • Do-It-Yourself.

How to Order:
To order by credit card call toll free
1-800-762-7874

(In NC call 919-878-3600)
Or mail us your personal check,
money order or MasterCard/VISA/
American Express information.
NC residents include 4.25% sales
tax. Please add \$1.50 for shipping
and handling per order. (Foreign
orders, except Canada, add \$15.00
per order; US funds only. No CODs.)

Our Guarantee: Use your template
for 20 days. If you are not completely
satisfied return it to us for a full refund.



Systems Management Associates
3325 Executive Drive, Dept. B-12
Raleigh, North Carolina 27609

tron instead of an ordinary keyboard. (You'll also get more than your share of stares from anyone who sees you at work.)

From a practical standpoint, bigger productivity boosts are probably more likely to come from one of the other, more traditional keyboard alternatives. For quick cursor positioning, my top choice is the SmartBoard. It gave the surest, most effortless, yet most precise control. Using WordStar with this keyboard, I can zip to any place on the screen more quickly than ever before. Even BASIC programs are easier to edit. Similarly, finding a spreadsheet cell can be zippy indeed.

Were I to concentrate my artistic efforts on drawing on my PC screen, however, I would be tempted to make the Key Tronic KB 5153 my primary typing tool, but I'm not yet totally won over. Because I'm left-handed, the touchpad on the far right loses a lot of its convenience for me. Right-handed sketchers will probably find that it suits them just fine.

Individual differences will probably prevent any one keyboard from becoming the perfect data entry instrument for all users. But if one of these suits your individual taste and style, your hours at the PC may become more pleasant. ■

Winn L. Rosch is a contributing editor of PC Magazine.

Please send (Quantity and format) _____ templates to:

Name _____

Address _____

City _____ State _____ ZIP _____

☐ MasterCard Card No. _____ Exp. Date _____

☐ American Express _____

☐ Visa Signature _____

CIRCLE 165 ON READER SERVICE CARD



Sizing Up Your Files

DOS utilities don't always give you an accurate picture of the actual size of your files. SIZE and FREE will help you know just how much space you really have.

If you frequently move files between directories or between floppies and a fixed disk, you've probably learned that the available space reported by CHKDSK, TREE, or DIR is often overoptimistic. When trying to back up a group of files whose lengths add up to roughly 300K onto a newly formatted diskette, you get the dreaded "Insufficient disk space" message. You know that a diskette is supposed to hold some 362K bytes, yet 300K worth of files still don't fit.

It's not that DOS can't add, of course. The problem is that the DOS utilities report the actual size of the files, not how much room they require in a subdirectory or on a diskette. To illustrate the difference, just put a diskette into drive A: and use CHKDSK or DIR to show the number of bytes it has available. Then add a short batch file to the disk by entering

```
copy con test.bat<cr>
echo hello<cr>
<F6><cr>
```

Your directory will now report

```
TEST BAT 12 date time
```

But look at the bytes available on the disk. You now have 1,024 bytes less than when you started. If you now try the same test on your fixed disk, you'll discover that the same 12-byte file has shortened your disk space by a whopping 4,096 bytes.

This is a consequence of the way DOS allocates space on diskettes and fixed disks. As a widely unread section of the DOS manual notes, file space is allocated by clusters, with a one-cluster minimum. On a double-sided, nine-sector-per-track disk, a cluster contains two contiguous

1986/No. 1

sectors, and since a sector contains 512 bytes, the minimum DOS storage allocation for floppies is 1,024 bytes. Fixed disks allocate eight sectors, or 4,096 bytes per cluster. On a fixed disk, your 12-byte .BAT file wastes no less than 4,084 bytes! [Note: the PC AT's 20-megabyte hard disk is less wasteful with small files, since its cluster size is 2,048 bytes (four sectors).—Ed.]

Sizing Up Your Needs

For backing up and copying files, then, what you need is a program that shows you the actual storage requirements for your files. SIZE.COM is a short (one-cluster) utility that calculates the total number of bytes required for copying anywhere from 1 to 255 files, grouped (using wildcards) by type or filename. It works on any drive or directory or subdirectory and from any subdirectory. And just for good measure, I've thrown in a shorter program called FREE.COM that lets you know how many bytes have been allocated and how many are still available and is much faster than waiting for DIR or CHKDSK.

Getting Measured

PC Magazine's Interactive Reader Service at (212) 696-0360 has copies of the .COM, .ASM, and .ASC (BASIC) versions of SIZE and FREE, and you can download any of these files by modem. Your communications software must be able to use Xmodem to download the .COM versions directly; the other two can

YOUR BACK-UP SYSTEM FOR ADVANCED PC INFORMATION



As an IBM PC expert, you're the source of information on IBM PCs.

But when you need answers, where do you turn?

TURN TO PC TECH JOURNAL — you can depend on it every month for the most authoritative coverage of innovative applications, systems design, and technical information.

Save 47% off the single copy price of \$47.40.

One year (12 issues) only \$24.97.

Use the coupon below, or call
1-800-852-5200
toll-free

TECH
JOURNAL

PO. Box 2966
Boulder, CO 80322

62490

YES! I want to subscribe to PC TECH JOURNAL for one year (12 issues) for only \$24.97 — nearly half off the one-year single copy price.

Mr./Mrs./Ms. _____

Company _____

Address _____

City _____

State _____ Zip _____

Savings based on full one-year (12 issues) single copy price of \$47.40

Check one:

☐ Payment enclosed ☐ Bill me later

Charge my:

☐ American Express ☐ Visa ☐ MasterCard

Card No. _____

Exp. Date _____

Please allow 30 to 60 days for delivery of first issue

PROGRAMMING/UTILITIES

be downloaded in straight ASCII. If you get SIZE.ASC and FREE.ASC from our service, REName them with .BAS extensions and run them once under BASIC. This will create the .COM files for you, automatically. Alternatively, if you have no modem, you can type in SIZE.BAS (shown in Figure 1) and FREE.BAS (shown in Figure 2) and create the commands by running them. And assembly language fans, take heart: Your pleas have been heard. Beginning with this issue, as shown in Figures 3 and 4, *PC Magazine* is returning to its previous practice of including the source code with the articles.

Sizing Up the Situation

Using SIZE.COM is simple. It has just two parameters, the drive and directory that you want to read and the files in which you're interested. Both parameters may be omitted, in which case you'll get a total for the current directory. The format is uncomplex:

SIZE [dr:][\path\filename]

where dr: may be any drive from A: through D:, path may be \ if you want the root directory or the complete path for a file or file type in any directory on the disk, and the entry for filename may contain global characters. Both programs can be used with or without a fixed disk, but they must be resident on the current drive. The two programs require DOS 2.0 or later and use up no memory space since they're not resident in DOS. If a path is entered, it must be preceded by a \ and must include a file specification. If a filename is entered without a path, then no \ is necessary. The output of SIZE.COM can be redirected to the printer or a file. Some sample entries include:

SIZE\ Read all files in the root directory.

SIZE*.COM Read only .COM files in the root directory.

SIZE *.BAS Read only .BAS files in the current directory.

SIZE A: Read all files on drive A:.

SIZE A:*.EXE Read only .EXE files on drive A:.

SIZE\SYMPHSHEETS*.WRK

Read only .WRK files in the subdirectory SHEETS on the current drive.

SIZE C:\ASSEM*. * Read all files in

```
100 ' Program for creating SIZE.COM
110 CLS:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 42
130 FOR C=1 TO 17
140 READ A$:IF C<17 THEN 160
150 A$=A$+VAL(A$)
160 NEXT C:NEXT
170 IF A$=52740 THEN RESTORE:GOTO 200
180 PRINT "ERROR: CHECK THE LAST NUMBER IN"
190 PRINT "EACH DATA STATEMENT--THEN REDO:END
200 FOR B=1 TO 42
210 FOR C=1 TO 16
220 READ A$:TTL=TTL+VAL("5H"+A$)
230 NEXT
240 READ S:IF S=TTL THEN 270
250 PRINT "DATA ERROR IN LINE";B*10+330
260 PRINT "CHECK FIGURES AND REDO:END
270 TTL=0:NEXT:RESTORE
280 OPEN "SIZE.COM" AS #1 LEN=1:FIELD #1 AS D$
290 FOR B=1 TO 42
300 FOR C=1 TO 16
310 READ A$:SET D$=CHR$(VAL("5H"+A$))
320 SET #1:NEXT:READ DUMMY$:NEXT:C:CLOSE
330 PRINT "SIZE.COM CREATED"
340 DATA 59, 30, 01, 0A, 53, 49, 5A, 45, 20, 50, 05, 72, 73, 20, 31, 2E, 1193
350 DATA 30, 20, 2D, 28, 0D, 0A, 24, 43, 6F, 70, 79, 72, 09, 67, 68, 74, 1169
360 DATA 20, 43, 29, 20, 31, 39, 30, 35, 0D, 0A, 24, 3A, 69, 66, 6E, 005
370 DATA 20, 44, 61, 76, 69, 73, 20, 50, 75, 62, 6C, 69, 73, 68, 69, 6E, 1522
380 DATA 67, 20, 43, 6F, 6D, 70, 61, 6E, 79, 0D, 0A, 24, 00, 3A, 5C, 2A, 1113
390 DATA 2E, 2A, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00
400 DATA 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 0
410 DATA 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 0
420 DATA 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 0
430 DATA 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 00, 10
440 DATA 00, 00, 00, 00, 00, 00, 20, 62, 79, 74, 65, 73, 20, 69, 6E, 20, 062
450 DATA 00, 00, 00, 00, 20, 66, 69, 6C, 65, 20, 73, 29, 0D, 0A, 00, 00, 00, 00, 0
460 DATA 00, 00, 00, 00, 00, 00, 20, 62, 79, 74, 65, 73, 20, 72, 65, 71, 943
470 DATA 75, 69, 72, 65, 64, 20, 6F, 6E, 20, 64, 89, 73, 6D, 65, 74, 74, 1582
480 DATA 65, 20, 73, 29, 0D, 0A, 00, 00, 00, 00, 00, 00, 00, 00, 20, 62, 65, 450
490 DATA 79, 74, 65, 73, 20, 72, 65, 73, 75, 69, 72, 65, 64, 20, 6F, 6E, 1603
500 DATA 20, 66, 69, 70, 65, 64, 20, 64, 69, 73, 6D, 0D, 0A, 24, 0A, 1090
510 DATA 49, 66, 76, 61, 6C, 69, 6A, 20, 70, 61, 72, 61, 6D, 05, 74, 65, 1050
520 DATA 72, 20, 73, 29, 0D, 0A, 0F, 72, 20, 66, 69, 6C, 65, 20, 73, 29, 1202
530 DATA 20, 66, 6F, 74, 20, 66, 6F, 75, 65, 64, 0D, 0A, 24, 1E, 20, 1003
540 DATA 58, 0A, 83, 09, 05, 00, 0A, 3C, 3A, 74, 03, 7D, 9A, 1A, 1683
550 DATA 19, 0D, 21, 04, 41, 0A, 0C, 0F, 52, 01, 0E, 00, 00, 00, 00, 1570
560 DATA 75, 06, 08, 0E, 00, 0A, 5B, 90, 3C, 02, 75, 14, 46, 0A, 3C, 5C, 1005
570 DATA 74, 03, 09, 06, 00, 0E, 4C, 01, 09, 06, 0F, 03, 0A, 00, 48, 90, 1026
580 DATA 3C, 03, 75, 22, 46, 0A, 0C, 20, 3C, 61, 70, 03, 09, 0C, 00, 00, 1218
590 DATA 64, 76, 03, 09, 05, 00, 0A, 3C, 3A, 74, 03, 7D, 9A, 1A, 1688
600 DATA 08, 00, 00, 0D, 1A, 90, 3C, 04, 75, 0C, 40, 09, 03, 00, 0F, 0A, 1023
610 DATA 18, 70, 00, 0D, 0A, 90, 46, 0A, 3C, 0D, 74, 03, 0A, 00, 00, 00, 1792
620 DATA 52, 01, 09, 20, 00, 04, 4E, 0D, 21, 73, 03, 00, 4E, 90, 0D, 74, 1719
630 DATA 08, 04, 4F, 0D, 21, 72, 05, 00, 00, 00, 00, 00, 75, 2E, 01, 95, 01, 1792
640 DATA 2E, 08, 16, 97, 01, 0F, 05, 01, 00, 00, 00, 00, 2E, 01, 93, 01, 20, 1410
650 DATA 02, 0F, 03, 01, 0E, 34, 00, 2E, 01, 99, 02, 0D, 00, 04, 0F, 03, 1091
660 DATA 0F, 03, 01, 0E, 25, 00, 2E, 01, 9B, 01, 00, 00, 10, 0F, 03, 0F, 1089
670 DATA 0D, 01, 20, 16, 00, 0A, 9D, 01, 0B, 04, 90, 0A, 0F, 02, 04, 09, 1011
680 DATA 0D, 21, 0B, 07, 02, 09, 03, 00, 0F, 0A, 03, 07, 0A, 00, 00, 00, 2174
690 DATA 01, 30, 95, 20, 02, 0F, 03, 95, 0F, 0F, 03, 0A, 01, 00, 15, 0F, 30, 2272
700 DATA 00, 00, 00, 75, 0E, 03, 20, 02, 0F, 0F, 06, 03, 01, 0D, 0A, 00, 00, 1740
710 DATA 40, 00, 00, 56, 02, 52, 50, 00, 00, 0A, 0F, 03, 0A, 00, 74, 1637
720 DATA 02, 0F, 06, 99, 01, 2E, 01, 00, 99, 01, 50, 5A, 52, 50, 1200
730 DATA 00, 10, 0F, 03, 03, 0A, 00, 74, 05, 2E, 0F, 00, 00, 01, 2E, 01, 1518
740 DATA 06, 90, 01, 58, 2E, 01, 06, 95, 01, 73, 05, 2E, 0F, 06, 97, 01, 1032
750 DATA 50, 2E, 01, 06, 97, 01, 03, 00, 00, 00, 00, 00, 00, 00, 00, 400
```

Figure 1: The BASIC program to create SIZE.COM.

the subdirectory ASSEM on drive C:, redirecting the resultant output to the printer.

Entering SIZE with no parameters tallies all the files in the current subdirectory, the following report being typical:

```
69622 bytes in 29 file(s)
87040 bytes required on diskette(s)
159744 bytes required on fixed disk
```

This is two files less than the DIR command would report, since the directory en-

tries themselves are not included in the total. Notice that our files will actually require a bit over 87,000 bytes of diskette space and on a fixed disk, nearly 160,000!

After using SIZE to total up your storage needs, FREE will tell you, in the same way, whether a given diskette will hold your files. It typically reports thus:

```
362496 bytes total disk space
57344 bytes allocated
305152 bytes available on disk
```


How SIZE Works

The `SIZE.ASM` file is well documented throughout. I'll present only an overview of its various sections. `SIZE.COM` consists of six main sections: read and verify user entry; add necessary global characters; find all specified files; calculate total bytes and clusters; and print results.

The program begins, of course, by setting up the stack for return to DOS. It then gets the current drive, which will be required for some entries, and stores it in memory. The next step is to examine the user entry to see if any parameters were entered and to check them for validity.

.COM files contain a 256-byte "Program Segment Prefix" that starts at offset 00. The program actually begins at offset Hex 100 following the PSP. At offset 80 can be found all the parameters that were entered after the user invoked the file. Suppose the following command was entered from DOS:

SIZE \ASSEMBLY\UPDATE.ASM

You can look at the contents of memory starting at offset 80H with DEBUG by entering

DEBUG SIZE.COM \ASSEM\UPDATE.ASM

hitting the Return key and then entering d80 to display the contents of memory at that location. When you do, you'll see a string of ASCII-coded bytes (the letters show up on the right of the display) preceded by a 12H, which indicates the number of characters (18 in decimal) that were entered. It's this byte that SIZE.COM uses to detect what was entered and what format was used.

There are five possibilities: that no parameters were entered, that only the \ was entered (for the root directory), that a drive letter was entered by itself, that a drive letter and a \ was entered, or that a complete pathname was entered. To contain the parameters for the search, a 65-byte buffer is provided, since up to 64 characters may be entered in a pathname, and it must be followed by 1 zero byte.

In the first case, the byte at offset 80 will be zero. If this is found, `SIZE.COM` merely places the global characters in the buffer and proceeds to its search phase. If the first byte is a 2, then the user must have entered only one character, the backslash

(a space and the character itself), and `SIZE.COM` must check for the \ to see if it's there. If it is found, the global characters are added and execution proceeds to the search. If the first byte is a 3, then the entry must have been the space, a drive letter, and a colon. `SIZE.COM` must verify the validity of the drive letter and the existence of the colon, and if both are found, the global characters are added, and the program again proceeds to the search. If there's a 4 in the first byte, the user may have entered a drive letter, a colon, and a slash. `SIZE.COM` grabs the three characters without checking and proceeds to the search. (Checking is ignored here, since if the entry is invalid, the search functions will trap for them.)

The final possibility, of course, is that the user entered a full pathname. In this case, the entire entry is loaded into the buffer, again without checking, while the program merely looks for a carriage return (ODH) at the end to mark the end of the en-

try. Again, an invalid entry will be trapped by the search function.

The search for files must be done in two steps: that of finding the first occurrence of the file and then of finding all the rest. The DOS function 4EH requires the attribute byte to be specified in the CL register. Here I have entered 20H. This allows the program to report all files except directory entries (which are files in themselves and in which we are not interested) and hidden files. If no file is found, then INT 4EH sets the carry flag. A check is made for this, and if the carry flag is set, SIZE.COM prints an error message and exits. If a file is found, DOS makes an entry in the current DTA (at offset 80H) that must not be disturbed during the next step. INT 4FH uses this information to find all the rest of the files, then sets the carry flag when no more have been found. If the program arrives at the find_next label, however, that means that at least one file was found, and thus the exit here is to the end of the program.

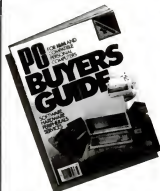
```

100 * Program for creating FREE.COM
110 CL$=SPRINT "Checking DATA; please wait..."
120 FOR B=1 TO 22
130 FOR C=1 TO 22
140 READ AS:IF C<17 THEN LINE 166
150 $A=16+VAL(AS)
160 NEXT:NEXT
170 IF $A=38186 THEN RESTORE:GOTO 286
180 PRINT "ERROR: CHECK THE LAST NUMBER IN"
190 PRINT "EACH DATA STATEMENT--THEN REDO":END
200 FOR B=1 TO 22
210 FOR C=1 TO 16
220 READ AS:TTL=TTL+VAL("4B"+AS)
230 NEXT
240 READ $:IF $=TTL THEN 270
250 PRINT "DATA ERROR IN LINE;B*16+338"
260 PRINT "CHECK FIGURES AND REDO":END
270 TTL=8:NEXT:RESTORE
280 OPEN "FREE.COM" AS #1 LEN:=FIELD #1.1 AS DS
290 FOR B=1 TO 22
300 FOR C=1 TO 16
310 READ AS:LET CS=CHR$(VAL("4B"+AS))
320 PUT #1:NEXT:READ DUMMYS:NEXT:CLOSE
330 PRINT "FREE.COM CREATED"
340 DATA 89, C#, 80, BA, 46, 52, 45, 45, 28, 56, 65, 72, 73, 28, 31, 28, 1312
350 DATA 38, 28, 20, 28, 33, 65, 78, 74, 29, 28, 31, 39, 38, 35, 28, 20, 939
360 DATA 28, 62, 73, 28, 41, 72, 74, 28, 40, 65, 72, 72, 69, 6C, 6C, 80, 1358
370 DATA 2, 3, 6F, 78, 73, 62, 67, 68, 74, 28, 67, 68, 74, 28, 28, 43, 28, 1231
380 DATA 31, 39, 38, 35, 28, BA, 24, 5A, 68, 66, 68, 20, 44, 61, 76, 69, 1186
390 DATA 73, 28, 50, 75, 62, 6C, 69, 73, 88, 69, 68, 67, 20, 48, 67, 6D, 1511
400 DATA 78, 61, 76, 75, 60, BA, 24, 8A, 88, 88, 88, 88, 88, 88, 88, 88, 589
410 DATA 2, 2, 79, 74, 65, 73, 28, 74, 61, 6C, 28, 64, 73, 1515
420 DATA 68, 28, 73, 78, 61, 63, 65, 8D, 8A, 88, 88, 88, 88, 88, 88, 88, 686
430 DATA 88, 28, 62, 79, 74, 65, 73, 28, 61, 6C, 6C, 6C, 63, 61, 74, 65, 1452
440 DATA 64, 8D, 8A, 88, 88, 88, 88, 88, 88, 88, 28, 62, 79, 74, 65, 951
450 DATA 73, 2, 61, 76, 61, 68, 61, 62, 6C, 65, 28, 68, 68, 68, 68, 1463
460 DATA 73, 68, 8D, 8A, 2A, 24, 5C, 88, 88, 88, 88, 88, 88, 88, 88, 88, 1423
470 DATA 81, 34, 88, CB, 21, 34, 5C, 88, 88, 88, 88, 88, 88, 88, 88, 88, 1423
480 DATA 51, 52, 87, 83, 87, 81, 8D, 8A, 81, 92, 8A, 92, 8A, 92, 8A, 2758
490 DATA 51, 88, 75, 88, 5A, 59, 58, 87, 82, 87, 81, 8F, C#, 81, 92, 8A, 2758
500 DATA 51, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 1649
510 DATA 81, C#, 81, 26, 88, CB, 81, 73, 81, 8A, 8F, 88, 81, 88, 88, 88, 1381
520 DATA 8A, 67, 81, 24, 88, C#, 21, C#, 28, 87, 8A, 8A, 88, 8A, 88, 8A, 1745
530 DATA 83, 1D, 88, 74, 82, 85, 33, D#, 87, 73, 95, 87, 23, 8A, D1, 10, 2469
540 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 1138
550 DATA 75, 82, C#, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 555

```

Figure 2: The BASIC program to create FREE.COM

DO YOU KNOW THE 10,000 PRODUCTS AVAILABLE FOR YOUR IBM PC?



Whether you're adding-on a new printer, or in the market for new software, **PC BUYERS GUIDE** is your sourcebook to virtually every product available for IBM PCs and compatibles.

Updated and published every 90 days, **PC BUYERS GUIDE** lists over 10,000 products to help you purchase the equipment that meets your needs.

Order your copy of **PC BUYERS GUIDE** today!

PC BUYERS GUIDE

Ziff-Davis Publishing Co.
One Park Avenue — 4th Floor
New York, NY 10016, K. Armstrong

Please send _____ copies of the latest edition of **PC BUYERS GUIDE**. Enclosed is my check or money order for \$9.45* (\$7.95* plus \$1.50 for postage and handling) for each copy. (Price outside U.S. \$11.00)

Mr./Mrs./Ms. _____ (please print)

Address _____ AN32

City _____

State/Zip _____

*Residents of CA, CO, CT, DC, FL, IL, MA, MI, MO, NJ, NY State, and VT add applicable sales tax.

PROGRAMMING/UTILITIES

where the count gets reported.

While **SIZE.COM** is looping through **find.first** and **find.next**, a subroutine

named **tally** is called, that keeps score of the number of bytes in each file and of the number of clusters each requires. First

```

title SIZE.ASM by Art Merrill
page,132
segment para 'code'
assume cs:csseg
main proc far
org 100h
begin

banner db 'If,\'SIZE Vars 1.0 - ',cr,lf,'$'
db 'Copyright (C) 1985',cr,lf,'$'
db 'Ziff-Davis Publishing Company',cr,lf,'$'

if equ 0ah
cr equ 0dh
dta equ 0bh
drive db ' ',1
root global db ' ',a
buffer db 65 dup(0)
count dw 0
tot_bytes dw 0,0
disk_blocks dw 0
fix_blocks dw 0

asc_bytes db 'If,0 dup(0),\' bytes in \'
asc_files db '4 dup(0),\' files(s)',cr,lf
asc_disk db '8 dup(0),\' bytes required on diskette(s)',cr,lf
asc_fix db '8 dup(0),\' bytes required on fixed disk',cr,lf,lf,'$'

errmsg db 'If,\'Invalid parameter(s)\',cr,lf
db 'or file(s) not found',cr,lf,lf,'$'

begin:
push ds ;set up stack for return
sub sp,8x
push ax

mov dx,offset banner ;print banner
mov sh,9
int 21h

;get current drive
mov di,offset drive ;storage area for drive
mov dx,offset global ;we may need this address later
mov sh,19h ;current disk function
int 21h ;convert to ascii
add al,41h ;store it
stosb

;check for paramaters
cid ;clear direction flag
mov di,offset buffer ;set up register for storage
mov ai,dta ;start of data transfer area (dta)
lodsb ;get first byte
cmp al,0 ;zero indicates no params entered
jnc param ;params were entered
add global chrs ;add global chrs
jmp find_first ;process with search

aasz:
cmp al,2 ;did user enter just '\'?
jns asc ;no
inc si

lodsb ;check for backslash
cmp al,'\' ;found
jz error ;not found-error exit

mov si,offset drive ;moves drive,backslash and
mov cx,6 ;global chrs into buffer
rep jmp find_first ;process with search

aasc:
cmp al,3 ;did user enter just a drive?
jns asc ;no
inc si
lodsb
or al,20h ;makes lower case if not already

```

(Figure 3 continues)

Figure 3: The assembly language listing for **SIZE.COM**.

PROGRAMMING/UTILITIES

"count" is incremented, keeping track of the number of files found; then the number of clusters must be added file by file since,

as mentioned, each file needs its own cluster allocation. Since the total number of bytes could be in the millions if you're us-

```

cmp     al,'e'           ;is it A or greater?
jge     error            ;yes
jmp     error            ;no-error exit

add:    cmp     al,'d'           ;is it D or less?
jle     error            ;yes
jmp     error            ;no-error exit

stosb   ;store drive letter
lodsb   ;get next byte
cmp     al,'.'           ;is it a colon?
jle     error            ;yes
jmp     error            ;no-error exit

add:    stosb
call    add_global
call    find_first

mov     cx,20h
mov     dx,offset buffer
mov     cx,20h
mov     dx,offset buffer
mov     cx,4eh
int     21h
jnc     found_first
jmp     error

found_first: call    tally
find_next:   mov     cx,4fh
int     21h
jnc     count_up
call    tally
jmp     find_next

count_up:   mov     ax,tot_bytes
mov     dx,tot_bytes+2
di,offset asc_bytes+8
call    secii

mov     cx,count
sub     dx,dx
mov     di,offset sec_files+3
call    secii

mov     ax,disk_blocks
mov     bx,400h
mul     bx
di,offset sec_disk+7
call    secii

mov     ax,fix_blocks
mov     bx,1000h
mul     bx
di,offset asc_fix+7
call    secii

mov     dx,offset sec_bytes
jmp     exit

error:     mov     dx,offset errmsg
exit:      mov     ax,9
int     21h
;DOS function - print string

```

(Figure 3 continues)

MAGNUM PC

800-544-4354

ORDERS
ONLY

COMPUTERS

IBM PC, XT OR AT YOU CONFIGURE	SAVE
COMPAG DESKPRO S & PORTABLES	CALL
ERICSSON PORTABLE PC	NEW
AT&T 6300 PC	SAVE

EXPANSION CARDS

AST SIX PAC PLUS (64K & SIDENICK)	269
ADAPTEC PREVIEW	399/279
EVEREX GRAPHICS EDGE	319
HERCULES GRAPHICS CARD	329
COLOR CARD	168
IRMA 3278 EMULATOR	799
ORCHID PC BLOSSOM & TURBO	CALL
PARADISE MODULAR GRAPHICS CARD	NEW
PROFIT SYSTEMS MULTIGRAPH	CALL
PERSTY TIME SPECTRUM	269
QUADRAM QUADBOARD (OK)(64K)	225/269
STB ALL PROBLEMS	459
TECMAR GRAPHICS MASTER	459

DISK DRIVES

FULL HEIGHTS (FOR IBM)	FROM 110
HALF HEIGHTS (FOR IBM)	FROM 85
ALLOY PC-STOR/DICSTOR	CALL
AMPEX	CALL
EVEREX EXPANSION CHASIS	775
EXPANSION W/ 10 - 20 MB	FROM 1395
CORE AT 20 - AT 72	FROM 1249
IDEMGA BERNOLLI PLUS	2550
KAMERMAN LABS	CALL
MASTERLIGHT SYSTEM	CALL
NODAK 3.5 MB W/BACKUP SOFTWARE	662
PEACHTREE TECHNOLOGIES	FROM 599
TALLGRASS HARD DRIVES & TAPE	CALL

PC-IR ENHANCEMENTS

AST JR COMBO	CALL
RACORE DRIVE 2 ENHANCEMENT	449
10 MB ENHANCEMENT	SAVE
TECMAR JR CAPTAIN	325
JR WAVEJR 2ND MATE	SAVE

PRINTERS

CANON (FULL YEAR WARRANTY)	CALL
EPSON FX, RX, LX, LQ	CALL
OKIATA ALL MODELS	BEST PRICES
SMITH CORONA 100/D200/D300	199/299/419
STAR-MICRONICS SG-10/15	243/407
TOSHIBA P051/P340	1225/579

MONITORS

AMDEK 310 (IBM PLUG-IN - AMBER)	169
PGS MAX 12EHX-12	169/469
TAXAN ALL MODELS	CALL

SOFTWARE

SYMPHONY	475	COPY II PC	35
MULTIMATE	249	O-BASE III	399
SAMNA III	CALL	FRAMEWORK	399
ENABLE	SAVE	LOTUS 1-2-3	309

MODEMS

HAYES SMART MODEM 300/1200	199/399
1200B/1200	349/379
2400 BAUD MODEM	CALL
TRANSET 1000	CALL

ACCESSORIES

CHIPS 64K - SET OF 9	40
256K - SET OF 9	59
SWITCH BOXES MANUAL & AUTOMATIC	CALL

DISKETTES

BASF 5 1/4" SS/DD (Each-lots of 10)	1.20
5 1/4" OS/DD (Each-lots of 10)	1.75
5 1/4" OS/HD IBM-AT (Each-lots of 10)	4.35
MAXELL 5 1/4" OS/DD (Each-lots of 10)	2.25
VERBATIM 5 1/4" OS/DD (Each-lots of 10)	2.25

1-800-544-4354

ORDERS
ONLY

FOR INFORMATION - (404) 431-3112

5965 PEACHTREE CORNERS EAST B-2

NORCROSS, GEORGIA 30071

AVAILABILITY AND PRICES SUBJECT TO CHANGE

APPROVED CORPORATE ACCOUNTS WELCOMED

AT Power

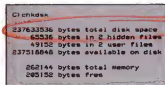
High performance, high capacity hard disk subsystems

A Single DOS Volume: up to 240 formatted MBytes in size on your PC is only the beginning of Emerald subsystems' features. However, it is a very important one to many of our customers.

Most serious micro computer users are familiar with the infamous 32 MByte DOS Barrier. Some of you have only read about it; others have run up against it head on when trying to run PC Focus or a downloaded mainframe program.

If you are one of those who have hit it head on you'll be pleased to know that for almost a year Emerald has been shipping fixed disk subsystems that solve your problem. Subsystems. Plural.

All Emerald subsystems can be operated as a single volume up to their formatted capacity. That includes our 36, 50, 70 and 140 MByte subsystems, in addition to the 280.



Actual printout of CHKDSK on 240 MByte volume.

You Determine how many volumes exist in your PC, and what size they are. You can have as many as 24 volumes, and make each one exactly the size it needs to be.

Set-up is menu driven and as simple as "How many do you want" and "How big should this one be?"

Integrate your existing hard drive into your new subsystem. Emerald's Disk-Meld technology makes it possible for your XT's 10 MByte, or AT's 20 MByte drive to become part of a single large volume. For example, if you have an AT with a 20 MByte

drive and an Emerald subsystem with a 70, you can use all your storage as a single 90 MByte volume. Disk melding makes it easy to combine Emerald drives with each other or with your existing drive to get a subsystem with the storage capacity you need.

Operating System and Network flexibility is yours for the asking. DOS 2.X, and 3.X will get you started. But, your Emerald subsystem can also support multi-user operating systems such as XENIX, VENIX, QNX and PCITX and networks such as Novell, Sytek, Ungermann-Bass, 3 COM, X-Net, 10 Net, DNA Systems...

Additional Features include password security, 30 millisecond average access time, automatic retreat to a safe landing zone in the event of power failure or shutdown, and a long list of PC and AT compatible micro computers.

High performance 1/4" tape backup

60 MBytes in 12 minutes is FAST backup, but there's more. If your files are larger than 60 MBytes, Emerald's Backup and Restore Utility (BRU) software will automatically break your file into 60 MByte sections and prompt you for a new cartridge. Of course, restoring is just as easy.



Compact tape drive fits in the AT's front panel expansion space. 60 MByte cartridges are certified for high performance and supplied with color coded labels.



Emerald subsystems were designed for the PC, AT and compatibles such as the AT & T 6300 and Compaq DeskPro.

Menu driven software makes it simple, even for novices, to backup or restore exactly what is needed, and in no time. Choose one or more files that were modified after a Specified Date and Time, one or more Specific Files or Directories, or All Files and Directories on a DOS Logical Volume.

Restore data on a different micro if you like. Backup up your company's Emerald subsystem in Portland, Maine and ship the tape to your office in Los Angeles. Because of the defect mapping technique used on Emerald hard disks, the subsystem in L.A. will import your data error free.



Special defect mapping technique allows data to be restored on subsystems other than the original source.

The BRU software automatically checks, and adjusts to, the defect map of every Emerald subsystem before restoring data to it.

r is Yours.

Configured for today's Micros

The Physical Design of the Emerald subsystems lets you determine the configuration that will best serve your needs. Many of today's high performance micros have sacrificed expansion space in favor of compact size; others offer plenty of room for additional drives, tape units and expansion cards. Emerald subsystems provide you with the expansion ability you need. And, they're designed to allow you to continue to expand as your needs continue to grow. No matter which PC you have, there is an Emerald subsystem that will meet your needs.



Subsystems are available for the PC, AT and true compatibles in a variety of configurations.

Internal Expansion is easy on the IBM AT and XT. Emerald subsystems are pre-initialized and pre-formatted—just slide the tape or hard drive you have selected into one of the existing expansion areas, plug in a couple of cables, tighten a few screws and replace the system cover. Elapsed time: 10/15 minutes.

The AT accepts 280 MBytes or any single drive up to 140 MBytes and a 1/4" tape drive. The XT accepts any Emerald hard drive up to 140 MBytes in size, or the 1/4" tape drive.

External and Portable expansion is easy and practical with the Emerald Portable Subsystems. These IBM color-matched subsystems have their own power supply and are available with hard drives up to 140 MBytes in capacity or with a 1/4" tape drive.

Ordering a tape host adapter card for each of your PCs and physically moving the 1/4" portable tape subsystem to where it is needed will save you *thousands of dollars* over the cost of individual portables for each micro.

The portable hard drive configuration is ideal for security sensitive environments. The hard disk is password protected and the entire subsystem is small enough to be locked in a standard safe or filing cabinet.



"Expansion chassis" subsystem also provides 6 additional spaces to add cards to your PC.

The 6 Expansion Slots in the Emerald expansion subsystems will be a welcome addition to many micros. If you don't have enough expansion room in your micro, or, if you've used every available slot, then one of these subsystems is just right for you. They are closely matched to the IBM PC in size and color, and have their own, built-in, power supply.

Expansion subsystems are available with drive sizes to 280 MBytes in capacity, with, or without, a built-in 1/4" tape drive. When coupled with an AT truly powerful computer system results.

The real backup procedure

Standing Behind You all the way is the company that broke the 32 MByte DOS barrier.



Documentation, host adapter card, software and cables are included with each subsystem.

First, we provide everything needed to get you up-and-running quickly. Then, we back you up with specialists, available 16 hours a day, to help with network implementation, applications support, XENIX and technical questions, and to provide 48 hour in-and-out repair service.

Delivery and Warranty are important considerations. Your Emerald subsystem will be shipped within 14 days of order, via UPS, and comes with a 30 day money back guarantee and a 120 day warranty. Warranty extensions are available for 1 and 2 year periods.



Fast service and fast shipping are company policies.

Users with large database applications in factory automation, CAD/CAM, accounting, medical, R&D, Point-of-Sale and many other areas are already telling their friends about Emerald. A large percentage of them are in Fortune 500 companies, and many others are on their way to Fortune status.

If your company fits one of those categories, or, if you're a smaller company with an application you thought could only be done on a mainframe or mini, pick up the phone. Call Emerald. An Applications Engineer is standing by to answer your questions, send you literature and refer you to an installed site in your area.

Let one of our customers tell you, first hand, how Emerald helped give his AT Power.



**Emerald
Systems Corporation**

Mainframe Storage for Micros

4757 Morena Blvd
San Diego, CA 92117
(619) 270-1994
U S A
Telex 353468 EMERSYS
Easylink 62853804

YOUR BACK-UP SYSTEM FOR ADVANCED PC INFORMATION



As on IBM PC expert, you're the source of information on IBM PCs.

But when you need answers, where do you turn?

TURN TO PC TECH JOURNAL —you can depend on it every month for the most authoritative coverage of innovative applications, systems design, and technical information.

Save 47% off the single copy price of \$47.40.
One year (12 issues) only \$24.97.

Use the coupon below, or call
1-800-852-5200
toll-free

**TECH
JOURNAL**

P.O. Box 2966
Boulder, CO 80322

62490

YES! I want to subscribe to PC TECH JOURNAL for one year (12 issues) for only \$24.97—nearly half off the one-year single copy price.

Mr./Mrs./Ms. _____

Company. _____

Address. _____

City. _____

State. _____ Zip. _____

Savings based on full one-year (12 issues) single copy price of \$47.40

Check one:

☐ Payment enclosed ☐ Bill me later

Charge my:

☐ American Express ☐ Visa ☐ MasterCard

Card No. _____

Exp. Date. _____

Please allow 30 to 60 days for delivery of first issue

PROGRAMMING/UTILITIES

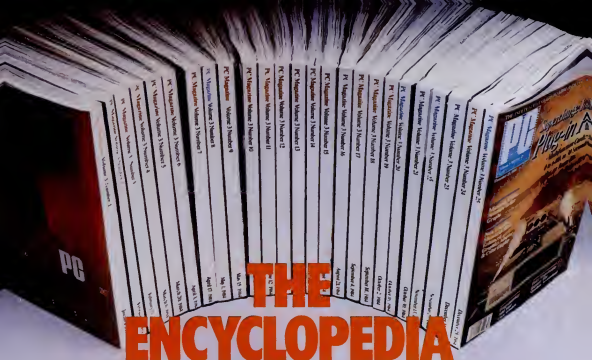
ing a fixed disk, two 16-bit words are required for storage. These two words are found at offset 9AH as each file is found and written to the DTA. As the file size is read, the program also calculates its cluster requirements. To find the requirements for diskettes, you must then divide the total bytes by 1,024 (400H) and for fixed disks [on the PC and PC-XT—Ed.], by 4,096

(1000H). Unless the total is an even multiple, there will be a reminder from the division. This will cost another 1,000 or 4,000 bytes. The words at disk_bloks and fix_bloks are incremented by these values. The total bytes are added to the running totals at tot_bytes (two 16-bit words) and if the addition at the low word produces a carry, then the high word must be incremented.

```

ret
main andp
edd_global proc near
    xchg si, dx
    mov cx, 3
    rap
    add_global endp
    aeci proc near
        xchg bp, dx
        mov bx, 9ah
        mov cx, 30h
        aaj:
            xchg ax, bp
            eub dx, dx
            div bx
            xchg bp, ax
            div bx
            or di, cl
            mov [di], di
            dec di
            cmp ax, 0
            jnz aaj
            ret
        endp
    tally proc near
        cub dx, dx
        inc count
        mov bp, 9ah
        mov ex, [bp]
        mov dx, [bp+2]
        push dx
        push ax
        mov bx, 400h
        div bx
        cmp dx, 0
        jz cck
        inc diek_block
        aek:
            add diek_block, ax
            pop ax
            dx
            push dx
            push ax
            mov bx, 1000h
            div bx
            cmp dx, 0
            jz eel
            inc fix_block
            aal:
                add fix_block, ax
                ex
                tot_bytes, ex
                jnc no_carry
                inc tot_bytes+2
            no_carry:
                pop ax
                add tot_bytes+2, ax
                ret
            tally endp
            caeg end
            etert
    
```

(Figure 3 ends)



THE ENCYCLOPEDIA OF INFORMATION FOR YOUR IBM PC

Taken one issue at a time, *PC* is the best source of up-to-date news and information about the IBM PC you can find anywhere.

But collect a few, and suddenly you realize that you've assembled a comprehensive reference work covering every significant new IBM PC application, product and development. *An encyclopedia you receive 22 times a year!*

Each volume of *PC* contributes the latest information on a wide variety of subjects including:

- **New Products** What's the latest in printers, word processing software and database managers? And what's best for your needs? Everything you need to know is in *PC*'s special reports and product reviews.

- **New Applications** Need to design a graphics presentation? Communicate with other PCs? Access a database? Find out how in *PC*'s expertly written articles.

- **New Developments** How are successful professionals and companies using their PCs? Find out in *PC*'s "Pro Columns" and use their proven techniques to move ahead in your own career.

Subscribe to PC today. Build your own IBM PC reference library by volume and save up to 50% off the regular one-year subscription price!

- One year (22 issues) only \$21.97. (Save 37%).
- Two years (44 issues) only \$34.97 (Save 50%).

To order, complete attached order card or call, toll-free,
1-800-852-5200



42452



A man, his dog, his pipe, and Volkswriter 3...

ir•ref'ra•ga•bly yours

You may never have to spell *irrefragably*, but with Volkswriter 3 you'd spell it (and 170,000 other words) correctly. That's twice as many words as most other word processors can offer. Our best Volkswriter ever lets you spell, hyphenate, sort, and calculate effortlessly and naturally.

When you want to check your spelling, a simple keystroke flags your mistakes and gives you alternative spellings. Abbreviations, acronyms, capitalizations, cities and common business names are included, and you can create a personal dictionary. We even hyphenate for you automatically. Forgive our *rodomontade*, but Volkswriter 3 can help you perfect your *syntagma*!

When you need to calculate, Volkswriter 3's advanced math features are ready, like a mini-spreadsheet at your fingertips. You can produce

expense reports and budgets, use constants and percentages and subtotals and ... well, just about anything arithmetical from the household to the board room.

You'll find Volkswriter 3 rich in extra features, too. You control the appearance of your copy with a wide range of layout options. Use it with over 200 best-selling printers; send personalized mailings and sort lists; use data from other popular programs, including WordStar® and IBM® DCA files. It runs on the entire IBM-PC family and is the perfect alternative to the more cumbersome MultiMate™ and DisplayWrite™3.

Now you can have *irrefragably* accurate words and numbers with Volkswriter 3. The price, by the way, hasn't changed: \$295. Enjoy the experience today. It will put you on top of the world!

Call us for upgrade information

DICTIONARY

irrefragably, *adv.* Undeniably
rodomontade, *n.* Boasting, bragging
syntagma, *n.* Word or phrase forming
a syntactic unit

INTRODUCING
volkswriter 3
Ask your dealer for a demonstration today



411 Pacific Street
Monterey, CA 93940
(408) 373-4718

TRADEMARKS—Volkswriter and the Lifetree Logo/Lifetree Software, Inc. • WordStar/MicroPro International • IBM and DisplayWrite 3/International Business Machines Corp. • MultiMate/MultiMate International

CIRCLE 385 ON READER SERVICE CARD

SHELF CONSCIOUS?

Now you can organize your copies of

PC MAGAZINE

Now your magazines can be a handsome addition to your decor, well organized, and easy to find, thanks to these durable library-quality cases or binders. They're made of luxury-lock leatherette over high-quality binder board. And both styles are custom-designed for this or any other magazine you save, with size, color and imprint selected by the publisher. FREE transfer foil included for marking dates and volumes.



Magazine binders

holds your issues on individual snap-in rods, combining them into one volume. \$7.95 each, 3 for \$22.50, 6 for \$42.50. Mixed titles OK for quantity prices.



Open-back cases

store your issues for individual reference. \$6.95 each, 3 for \$19.75, 6 for \$37.50. Mixed titles OK for quantity prices.



OR CALL
1-212-503-5319

PC Magazine

P.O. Box 5120, Philadelphia, PA 19141

Please send ☐ Cases ☐ Binders

TITLE _____ QUANTITY _____

PC Magazine _____

Other _____

☐ PAYMENT ENCLOSED \$_____ * Add \$1.00 per order for postage and handling. Outside USA add \$2.50 per unit ordered; send US funds only.

☐ CHARGE (Minimum \$10)
☐ American Express ☐ MasterCard
☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Print Name _____

Address _____

City _____

State/Zip _____

*Residents of PA add 6% sales tax

PROGRAMMING/UTILITIES

```

skip:   jnc     skip
        dec     dx
        mov     di,offset diff+7
        call    eecil
        mov     dx,offset total
        mov     ah,9
        int     21h

main:   endp

eecil:  proc    near
        xchg    bx,dx
        mov     bx,8ah
        mov     cx,30h

rpt1:   cmp     bp,8
        jz      rpt2
        xchg    ex,bp
        xor     dx,dx
        div     bx
        xchg    bp,ex
        div     bx
        sc      di,di
        mov     di,di
        dec     di
        jmp     rpt1

rpt2:   xor     dx,dx
        div     bx
        or      di,c1
        mov     di,di
        dec     di
        cmp     ax,8
        jns     rpt2

ascii:  ret     endp

cseg    ends
start
    
```

(Figure 4 ends)

complication, for you're handling two 16-bit words and can't divide a 32-bit value by 10 without an overflow. It's as if you wished to divide 100 by 10 but could not divide numbers larger than 99. The solution is to divide the original number in half, then to divide each by 10, and then to add the results together.

SIZE.COM does essentially the same thing. It divides the high word, then the low word plus the remainder, extracting what's left over, and then repeating the process until there's nothing left.

In the division, the digits were extracted from right to left. Therefore, they are stored backward in memory by setting DI at the end of the string and then decrementing it each time a digit is extracted. An 8-byte buffer is provided to contain up to eight digits, and it is arranged so that after the digits have been filled in, the program need only call the first byte of asc.bytes in order to print on the screen all bytes up to the delimiter 24H (\$) at the end of asc.fix. Line feeds and carriage returns have been made a part of the storage area. This allows

all the results to be printed on one INT 9 rather than printing each line individually. The error message is nestled within the print instruction so that it can use the same print command. All that then remains is the exit to DOS.

SIZE.COM, supplemented by FREE.COM, can provide valuable information on the total disk space available, the space that has been already used up, the space needed by files, and the total space on the disk. They're almost invaluable when you're doing backups, for if you run out of formatted disks during the backup process, you'll have to do it all over again.

Apart from backups, when your fixed disk starts to get low on space, you start looking through your subdirectories for files that can be removed to disk. You naturally look for big files. At 4,096 bytes each, however, a lot of small, unnecessary files can add up to a very sizable chunk. With SIZE and FREE, you'll know just how much space your files take up and where you can store what you don't need to have constantly available. ■

Arlington Computer Products gives you the best prices on IBM PCs...

IBM PC

2 Drives, 256K,
Monochrome Monitor **\$1925**

2 Drives, 256K,
Color Monitor **\$2099**

2 Drives, 256K,
10 MB Hard Disk,
Monochrome Monitor **\$2349**

IBM XT

1 Drive, 256K,
10 MB Hard Disk,
Monochrome Monitor **\$2549**

1 Drive, 256K,
10 MB Hard Disk,
Color Monitor **\$2695**

1 Drive, 256K,
20 MB Hard Disk,
Monochrome Monitor **\$2575**

IBM AT

Unenhanced
\$3095

1.2 Floppy
512K, 20 MB Hard Disk,
Monochrome Monitor

\$3995

COMPAQ PORTABLE, 2 Drives, 640K, Clock... **\$2125** 1 Drive, 640K, Clock, 10 MB Hard Disk... **\$2549**

...and disk drives too!

IBM	\$ 99
TANDON TM100-2	\$ 99
SHUGART SA455	\$ 84
TEAC FD55B	\$ 89
360K Drive for AT	\$119

10 MB HARD DISKS
from **\$429**

20 MB HARD DISKS from **\$499**
10 MB TAPE BACK UP
\$479

PERIPHERALS

TAXAN MONOCHROME	\$139
HERCULES GRAPHICS	\$289
HERCULES COLOR CARD	\$145
EVEREX THE EDGE	\$249
STB GRAPHICS PLUS II	\$249
TECMAR GRAPHICS MASTER	\$449
TSENG ULTRA PACK	\$499
TSENG ULTRA RAM	\$199
HAYES 1200 MODEM	\$379
HAYES 2400 MODEM	\$615
EVEREX 300/1200 INT. MODEM w/ software	\$229
US ROBOTICS 2400 MODEM	\$449
ORCHID PC TURBO	\$599
AST ADVANTAGE	\$399
AST 5251-11	\$649
64K RAM CHIPS bank of 9	\$ 9
256K RAM CHIPS each	\$ 4
128K RAM CHIPS each	\$ 6

★ISSUE HIGHLIGHTS★

AST 6 PACK w/64K	AT MULTIFUNCTION w/128K expandable to 3MB	HAYES 1200 B w/ software
\$215	\$239	\$339
QUADBOARD w/64K	EVEREX GRAPHICS EDGE	QUADCHROME II COLOR MONITOR by Quadram
\$179	\$259	\$379
APPARAT w/64K memory & clock	EVEREX MINI MAGIC w/384K memory only	PRINCETON HX 12 includes cable
\$109	\$115	\$419

PRINTERS

<u>EPSON</u>	
LX 80	\$219
FX 85	\$325
FX 185	\$459
LQ 1500	\$879
Interface for LQ 1500	\$ 75

<u>OKIDATA</u>	
ML 192	\$359
ML 193	\$499
84 IBM	\$649

<u>SILVER-REED</u>	
EXP 400	\$249
EXP 500	\$289
EXP 550	\$399
EXP 770	\$699

<u>TOSHIBA</u>	
1340	\$549
351P/S	\$1095

<u>NEC</u>	
P2	\$499
P3	\$715
2050	\$639
3550	\$1025

SOFTWARE

LOTUS 123	\$329
SYMPHONY	\$409
WORDSTAR 2000	\$249
WORDSTAR 2000 PLUS	\$299
D BASE III	\$369
FRAMEWORK	\$369
PC MOUSE w/paint brush	\$119
HAYES SMARTCOM II	\$ 95
CROSSTALK	\$109
KEEP TRACK Home Accountant	\$ 39

CIRCLE 114 ON READER SERVICE CARD

**Arlington
Computer
Products, Inc.**

450 E. HIGGINS ROAD
ELK GROVE VILLAGE, IL 60007



FOR ORDERS & SYSTEMS QUOTES:

800-548-5105

OR
CALL **800-548-5106**

FOR INFORMATION AND IN ILLINOIS CALL 312-228-6333

Prices and Availability Subject To Change Without Notice

Why crawl
when you can
sprint with
APPLICATION 1?



Assembler speed in IBM Basic and Microsoft "C".
Mainframe power for your IBM PC.
Create network applications*
Choice of file or record locking.

Today's programmers want more than development tools and Data Base Managers that merely crawl when they need to sprint. APPLICATION 1's rich assembler routines combined with IBM Basic or Microsoft "C", sprints during the creation and execution mode of your software...and that means up to 6 times faster and more!

Its remarkable efficiency is a result of this unique file system. Achieve unperceivable performance differences from files containing 300 to as many as 80,000 records or more. Design screens in minutes with Genscr, our full screen editor. And most important, APPLICATION 1 opens up the door to file sharing in update mode. Now.

Conserve precious disk space with variable length record and key indexes. With unlimited files, fields, records and 8087/80287 support, APPLICATION 1 has it all.

You can grow with us because we bring no limitation to your imagination and future requirements.

We've prepared a "Demonstration Kit" for Application 1. This includes complete documentation and demo disk. Order yours today for \$49.95 (US) which is refundable on the purchase of the \$595.00 (US) full version. Contact Logiquest at 514-397-9631.



LOGIQUEST

Logiquest Inc.
555 Dorchester West, Suite 1616
Montreal, Quebec, Canada H2Z 1B1
1-514-397-9631

Required:
PC DOS 2.1 and up
PC DOS 3.1 and up for networking
256k Ram.
IBM PC, XT, AT, and compatible
IBM Network Cards presently supported*

©APPLICATION 1 is a trademark of Logiquest Inc. Montreal. IBM, IBM Basic are products and trademarks of International Business Machines. Microsoft is a trademark of Microsoft Corporation.

Spreadsheet Clinic

This forum lets readers exchange the ingenious solutions and timesaving hints that make their spreadsheets and integrated software packages work better.

Time Conversions with 1-2-3

I used the cell-mating macro in your September 3 column (Volume 4 Number 18) to keep track of the results of bicycle races. My problem was to find a way to display results as hours:minutes:seconds rather than as minutes:seconds—as 5:12:05 rather than 312.05.

The macro shown in Figure 1 calculates hours, minutes, and seconds from a total time expressed in seconds, which you enter in the first row of the spreadsheet. Results are displayed in a single cell in row 2. All labels in the first column are range names for the cells to their right. In rows 4 through 6, the macro calculates values for hours, minutes, and seconds. In rows 7 through 14 it converts the values into labels, and in rows 15 through 21 it combines the labels into a single cell named RESULT. Note that in lines 9 and 12 the macro tests the minutes and seconds and adds a leading 0 if the value is 9 or less.

Larry Johnson
Gunnison, Colorado

I'm inclined to assume that your timing device probably works in minutes and seconds rather than in seconds only. This would mean that you presently have to convert to seconds before you enter the time and run the macro. If so, why don't you start the macro with prompts for minutes and seconds and then let 1-2-3 do the conversion?

The submission immediately below may also give you some ideas. Your macro would run quicker if the conversion formulas in lines 4 through 6 were in cells by themselves rather than inside the macro. You could then copy their instant results to lines 16, 18, and 20, convert to labels, and combine them in a single cell.

More Time Conversions

Occasionally you may need to use time calculations that produce results in minutes and fractions of minutes. You can use *Symphony* and 1-2-3 to convert quickly a number such as 147.229 minutes into 2 hours, 27 minutes, and 14 seconds. Figure

2 shows the results of such a calculation, together with the formulas that do the job. Strictly speaking, the entries in column F are unnecessary duplicates of the formulas in cells D8 to D10; they are displayed only to show what's going on. Cell D5 has been given the range name TIME, and it is there that you input the value to be converted. The results will appear instantly in cells D8 to D10.

The last number in the last formula sets the number of decimal places displayed after rounding. If it were set to zero, seconds would be displayed only as whole numbers. If it were set to 2, hundredths of a second would be displayed.

Stan Scott
New York, New York

Clever formulas can give you quicker results than macros. However, in this instance, the values in cells D8 to D10 could be combined into a single cell using the cell-mating technique shown in the time conversion in Figure 1.

1	TIME	13883.88	Input - time in seconds
2	RESULT	3:58:83	Output - formatted result
3			
4	\\S	{Goto}HOUR*Int((TIME/3600)*{Bdlt}){Calc}~	Enter formula for hours in HOUR, convert to value
5		{Goto}MIN*Int((TIME-3600*HOUR)/60)*{Bdlt}{Calc}~	Same for minutes
6		{Goto}SEC*(TIME-3600*HOUR-60*MIN)*{Bdlt}{Calc}~	Same for seconds
7		{Goto}HOUR*{Bdlt}{Home}~	Convert hours from value to label
8	DQ_MIN	{Goto}MIN~	
9		/x1MIN<9*{Bdlt}{Home}'0'/>{DQ_SEC}	Convert minutes to label WITH leading zero
10		{Bdlt}{Home}~	Convert minutes to label WITHOUT leading zero
11	DQ_SEC	{Goto}SEC~	
12		/x1SEC<9*{Bdlt}{Home}'0'/>{DQ_RES}	Convert seconds to label WITH leading zero
13		{Bdlt}{Home}~	Convert seconds to label WITHOUT leading zero
14	DQ_RES	{Goto}RESULT~	
15			
16	HOUR	3	The following
17			"keystrokes"
18	MIN	58	will be entered
19			in RESULT
20	SEC	83	
21			
22		{Goto}TIME~	

Figure 1: A macro that converts seconds to hours, minutes, and seconds.

	C	D	E	F
4				
5				
6	TIME	155.668		
7				Formulas in cells D8..D18
8	Hours	2		=INT(TIME/60)
9	Minutes	35		=INT((MOD(TIME,60)))
10	Seconds	40.1		=ROUND((TIME-INT(TIME))*60,1)

Figure 2: Formulas that convert minutes to hours, minutes, and seconds.

Testing Values Against a Standard

Sometimes it's necessary to test a long column of numbers against a standard value. You may, for example, need to know which numbers exceed an important parameter. The *I-2-3* macro shown in Figure 3 tests all the values in D3 to D10 against the standard in D1.

Before you run the macro, make sure that cells D1 and D13 have the range names in the cells to their left. Put the cursor at the top of the column to be tested, and hit Alt-C. The macro will march down the column of numbers and put a plus sign next to those that are larger than the test value, a minus sign next to those that are smaller, and a dot next to those that match the test value. When the macro comes to a blank cell or if the value is zero, it will quit.

The flagging mechanism works by using the +/- format in cells E3 to E10. In this format, a cell will display as many plus or minus signs as the value in that cell. Thus a +5 would show five plus signs and a -3 would show three minus signs. A zero becomes a period. Since the macro commands in D15 to D17 write only -1, +1, or 0 in column E, there are only three pos-

sible flags. In this way it takes only a quick glance to see how the numbers compare with the test value.

Stephen Schneider
Cape Canaveral, Florida

There are many variations on this useful technique. If you were looking only for values that exceeded the standard, for example, you could have the macro flag only those values rather than put something in column C for every value. Or again, you could use a series of IF statements such that numbers that exceed the standard by 10 percent get flagged with one plus sign, those that exceed it by 20 percent with two plus signs, and so on.

Macro-Making Macros

When I start work on a *I-2-3* spreadsheet, I first load my macro-maker file, which is shown in Figure 4. For the names of the commonly used special keys, such as {GoTo} or {Down} I have only to type the "open" curly bracket and then run the appropriate macro to complete the entry. When you call the function macro (Alt-F), it first types an @ and then supplies the pa-

rentheses when you hit Enter.

You can expand this table of macros depending on your needs. It takes some imagination to come up with good mnemonic macro letters for a full table, though, since some of the obvious letters will appear twice. For example, since I've already used {D} for {Down}, I would use {Z} (Zap) for {Del}.

These macro-makers not only save time, they keep your work consistent. You never have to worry about an unsightly

Alt	Down
Alt	End
Alt	Ctrl (Ctrl)
Alt	Ctrl
Alt	Home
Alt	Left
Alt	Y
Alt	Right
Alt	Up

Figure 4: A macro-making macro.

mixture of {GOTO}, {goto}, and {gOTO}, for example, and you won't have to keep checking the bottom of the screen to see whether the CapsLock is off or on.

Don Ford
Sacramento, California

I'm ashamed to admit that when I first looked at these macros, I couldn't understand why they didn't include the first curly bracket in the macros for {Down}, {Right}, and so forth. I'm sure all you wizard readers understood it in a flash.

What with all the sneaky things you can do with macros, it's easy to forget that they can be simple keystroke savers. Typing macro code is a chore, so it's good to see something that makes it easier.

If you {File Combine these macros into your current worksheet, you'll have to rename the macros, because {File Combine wipes out all range names. The easiest way to do the naming is to use {Range Name Labels} to attach the macro names to the cells to their right. You could write an installation macro that did that for you, but in that case you'd have to {Range

	C	D	E	F	H
1	AMOUNT	33965			
2					
3		33966 +			
4		33965 -			
5		33968 -			
6		33995 +			
7		33965 .			
8		33989 -			
9		33968 -			
10		33967 +			
11					
12					
13	%	=B3<C3			
14		=IF(B3="")/A3			
15		=IF(B3<C3)-1			
16		=IF(B3=AMOUNT)-1			
17		=IF(B3>AMOUNT)-1			
18		{DOWN}			
19		/g%V			

Figure 3: A macro that tests a column of numbers against a value.

DOES YOUR HI-RES GRAPHICS BOARD SHOW YOU ONLY PART OF A SPREADSHEET

When it comes to printing out spreadsheets, most IBM[®]-compatible graphics boards come up short.

But not the Genoa Spectrum[™] Color/Mono/Graphics Board.

what you're doing. On the screen. And on paper.

But the best part is, you don't have to pay more to do it. Here's why: Up until now, if you wanted

software in monochrome. And for your monochrome software there's a 720 x 348 hi-res mode.

So either way, you're covered. Spectrum is compatible with all color and monochrome monitors. So you'll always get 16 beautiful colors in color. Or 16 shades of monochrome in mono.

For all the technical specs or the Genoa Spectrum dealer nearest you, just call us at 408-945-9720. Or write Genoa Systems Corporation, 73 E. Trimble Road, San Jose, CA 95131.

The Genoa Spectrum. It's the only board you'll ever need for color, graphics, and full size output.

Anything else is either too much money or incomplete.

Genoa
We make IBM PCs better.



The Spectrum Color/Graphics Board is the most compatible board you can buy. Which means it runs the most software. Including Flight Simulator[®], Lotus[®] 1-2-3[®], Symphony[®], SideKick[®], PC Pizza[®] and much, much more.

It goes all the way to 132 columns. The largest text display of any graphics board you can buy. There's even a special driver that'll show you 132 columns of Lotus, which normally only has 80.

And together with your 132-column printer, the Spectrum can also print every one of those 132 columns. So you can see more of

both graphics and color; you had to buy two boards. One for hi-res mono graphics, one for color.

But the Genoa Spectrum puts color and graphics on the same board. So you save yourself a slot. And about \$250.

You can also save yourself the price of a color monitor. Because Spectrum will emulate your color

Spectrum is a trademark of Genoa Systems Corporation. © 1985 Genoa Systems Corporation

CIRCLE 239 ON READER SERVICE CARD

SPREADSHEET CLINIC

Name Create its macro name before you could run it.

Some Peculiarities in File Printing

The /-2-3 /File Print command is very useful when you need to save a worksheet in ASCII form. You can also use it instead of /File Xtract when you want to save part of one worksheet to disk and read it into another. A /File Print followed by /File Import takes fewer keystrokes than a /File Xtract followed by a /File Combine, though you have to be careful about whether you are importing numbers or text.

However, /File Print has a strange peculiarity. It produces an ASCII file with three blank rows at the beginning. Thus, if you import such a file into a worksheet, the contents will begin three rows below the cursor rather than at the cursor. Thus, if you write macros that do a /File Print to be

followed by a /File Import, be sure to move the cursor three rows above the point where you want the imported data to appear.

Juan Camps
Montevideo, Uruguay

The mystery is deeper than you think. If you do a /File Print of a column that is nine characters wide and then import it, as you say, it will appear three rows below the cursor. However, if you reset the column width to 15 and do another /File Print and Import, the contents appear right at the cursor. Why should the column width have anything to do with it? I don't know.

Another peculiarity of the /File Print command is that the ASCII file it creates never begins in the first column. If you get into DOS and TYPE the file you just wrote, you will find the contents are indented by at least four characters. This is true even

if—to take an extreme case—the material you saved with /File Print was in column A and that column was only one character wide. If column A is wider, its contents will be further indented.

If anyone has an explanation for this phenomenon, Mr. Camps and I would appreciate hearing it. In the meantime, I think I'll stick to /File Xtract and /File Combine.

Contribute to the Clinic

Share your latest spreadsheet discovery through PC Magazine's Spreadsheet Clinic. We'll pay you \$50 for anything we print, plus an extra \$25 if you submit it on a disk. If you send a disk, please include a printout of your submission in case of damage to the disk in transit.

Mail your contributions to Spreadsheet Clinic, PC Magazine, One Park Avenue, New York, NY 10016. ■

Build Your own IBM Compatible System

XT Building Tools

MONITOR ADAPTERS

Mono w/o printer port.....	\$99
Color Graphics.....	\$99
Mono w/printer port.....	\$135
Color Graphics w/p. port.....	\$135
Mono Graphics w/p. port.....	\$175
STB Chautier.....	\$299
Everex EDGE.....	\$299
Perasyt BoB.....	\$395
Color 400.....	\$400

MULTIFUNCTION BOARDS

AST Six Pak 384K.....	\$299
Quad 384K.....	\$299
384K Generic 6-pack.....	\$195

MISC. ITEMS

Floppy controller.....	\$69
DIC Hard disk controller.....	\$215
Teac 588.....	\$75
Quine 142.....	\$99
135 W Power Supply.....	\$99
XT Mother Board.....	\$250
Turbo Mother Board.....	\$350
Chassis.....	\$99
5150 style Keyboard.....	\$99
5151 style Keyboard.....	\$155
Alt style for XT.....	\$135

IBM XT Compatible KIT

\$695

Dual DS/DD, 256K 8 Slots, 135W Keyboard



PC SOLUTION ASSEMBLED SYSTEMS

All Systems include 8 Slots, 135W Keyboard, 90 Day Warranty, Hard disk systems at below

PC Solution XT	
2 DS/DD, 256K.....	\$795
2 DS/DD, 10 Meg.....	\$1295
PC Solution TURBO	
2 DS/DD, 256K.....	\$895
2 DS/DD, 10 Meg, 640K.....	\$1495
AT Solution	
Base, 256K.....	\$2295
Enhanced, 512K, 20 Meg.....	\$2995

Hard Disks & Controllers

10 Meg Internal.....	\$535
20 Meg Internal.....	\$835
30 Meg Internal.....	\$995
10 Meg External.....	\$699
20 Meg External.....	\$899

MODEMS

Hayes 1200.....	\$399
Hayes 1200B.....	\$315
Everex 1200B.....	\$195

MONITORS

Tefung.....	\$160
Taxxon 121.....	\$165
PGS MAX-12E.....	\$185
PGS HX-12.....	\$450
Taxxon 425.....	\$425
Taxxon 440.....	\$550
Xtron TTL.....	\$125

PRINTERS

Panasonic 1091.....	\$259
Panasonic 1092.....	\$369
Canon PW1080.....	\$299
Citizen MSP-10.....	\$289
Epson FX85.....	Coil
Epson FX185.....	Coil
Toshiba 1340.....	\$549
Toshiba 351.....	\$1295

Hi-Tec Computers & Electronics • (301) 564-9500

IBM is trade mark of IBM

10524 Detrick Ave., Kensington, MD 20895

PC Solution is trade mark of Hi-Tec Electronics, Inc.

CIRCLE 481 ON READER SERVICE CARD

Power User

Push your hardware and applications software to the limit with these productivity-enhancing tips from readers.

dBASE Statistical Functions

While reading some old journals, I found an article that solved one of my few problems with *dBASE II*. In 1961, Frank Taylor, at the University of Minnesota, discovered a simple formula for calculating the standard deviation, which was accurate and did not require calculating square roots.

Figure 1 lists the *dBASE II* code I based on this formula. It quickly calculates descriptive statistics from the data stored in a numeric field of a *dBASE* file. The formula separately sums the top and bottom one-sixth of a given range of figures, such as scores. The sum of the lowest scores is subtracted from the sum of the highest scores. The resulting value, divided by one-half of the total number of entries, is an estimate of the standard deviation.

Robert Arkell

Regina, Saskatchewan
Canada

Many readers have grumbled about the lock of built-in statistical functions in *dBASE II* and *III*. Mr. Arkell's wonderful program helps fill that gap, providing a simple means of generating statistical values from a data file's numeric fields.

One important caution is in order, however. In the line

```
STORE str(INT(A/6),1) TO R
```

the value and width of *R* can vary from 1 to 3 digits, depending on the result obtained by dividing *A* by 6. For greater accuracy in such cases, you should allow *R* to be larger by changing the 1 in the formula to 2 or 3. However, if you allow more than the exact number of digits for the variable *R* (by changing 1 to 2 or 3), the subsequent code *SKIP->R* will not work properly. Try it as written first, and then change the width of *R* only if it appears that the answer for *A/6* requires more than a single digit for accuracy.

```
ERASE
```

```
SET TALK OFF
```

```
? 'DESCRIPTIVE STATISTICS PROGRAM'
```

```
? ACCEPT 'DATA FILE? ' TO FILE
```

```
ACCEPT 'FIELD? ' TO FIELD
```

```
USE &FILE
```

```
?
```

```
? 'STEP 1 OF 4: INDEXING RECORDS'
```

```
INDEX ON &FIELD TO INDEX
```

```
USE &FILE INDEX
```

```
? 'STEP 2 OF 4: COUNTING RECORDS'
```

```
COUNT FOR &FIELD TO A.
```

```
? 'STEP 3 OF 4: ADDING VALUES'
```

```
SUM &FIELD TO SUM
```

```
STORE str(INT(A/6),1) TO R
```

```
? 'STEP 4 OF 4: FINDING HIGH/LOW VALUES, MEDIAN, MEAN'
```

```
GO TOP
```

```
STORE &FIELD TO LOW
```

```
SUM &FIELD NEXT &R TO SUM
```

```
GO BOTTOM
```

```
STORE &FIELD TO HIGH
```

```
SKIP -&R
```

```
SUM &FIELD NEXT &R TO TSUM
```

```
STORE A/2 TO NM
```

```
IF INT(NM) = NM
```

```
GO TOP
```

```
SKIP NM
```

```
STORE &FIELD TO H
```

```
*[SET HEADING OFF]
*[SET SAFETY OFF]
*[CLEAR]
```

```
*[COUNT FOR &FIELD=>H TO A]
```

(Figure 1 continues)

Figure 1: This program allows you to calculate descriptive statistics using *dBASE*. *dBASE III* code is shown in brackets in the right column.

ORDER TOLL FREE
24 HOURS EVERY DAY
800-662-2686

SOFTWARE

ACCOUNTING & FINANCIAL

BPI General Accounting	325	BPI Inventory	450
Peachtree per Module	279	Accounting Partner 2	539
Real World per Module	379	One Write Plus	179
Managing Your Money	165	Open for Business	329

DATABASE

dBase III	369	Relief	63
Copper	419	Rbase 5000	399
P/S: File & Report	155	OLA	199
Advanced 3D Master	299	OLA w/ 256K Card	279

SPREADSHEETS & INTEGRATED SOFTWARE

Lotus 1-2-3	Call	Symphony	Call
Ability	295	Framework	369
Smart SW System	495	Enable	349
Spreadsheet Auditor 2	95	Multiplan	119

WORD PROCESSING

Microsoft Word	275	Word Perfect	275
Volcanier Dumas	155	Samra II	299
Office Writer/Speller	260	Multimate	219
Peachment 5000	149	TriMark	194

GRAPHICS

Chartmaster	275	Signmaster	159
Microsoft Chart 2	179	Diagram Master	225
Emergraphics w/ Plot	235	Emergraphics	179
Graphicwriter Compa	300	PC Paintbrush/ Mouse	132
Autocad w/ ADE II	1789	GenDraw	69

UTILITIES

Pop Up Desktop	49	Fontrix	95
Gen Desktop	26	Gen Collection	119
Smartfont II	69	Beqz	119
Spotlight	92	Relay	99
Desk Organizer	59	Crostatik	105
Superproject	259	Timeline 2.0	279

LANGUAGES

Macro Assembler	99	MS Fortran	299
Microsoft Assembly	179	MS C Compiler	299
Quick Basic	63	True Basic	95
On Assembler Plus Tools	119	Pascal MT+	239

HARDWARE

Smartmodem 2400	579	Smartmodem 1200	379
Smartmodem 1200B	349	Verite 1/2 Card	365
Tecmar Captain 4K	169	SeaPlex 64K	259
Tecmar Captain 384K	299	SeaPlex 384K	299
J-Ram 20K 2MB	199	Advantage I 5MB	579
J-Ram 2	199	Perceptics Card 384K	379
Paradise Multiplex	299	Paradise Card 384K	379
Five Pak 384K	179	STB Cheaper	295
10MB w/ H.D w/ Cont	499	Genex Spectrum	299
20MB w/ H.D w/ Cont	599	Genex 200	379

PRINTERS & MONITORS

Epson FX 85/FX 165	Call	Epson LX 80/LX 90	Call
Epson LX 10/20/35	Call	Epson LX 1500	Call
Parasonic 1091	249	Amdex 210A	149
Parasonic 1052	399	Amdex 520	299
Parasonic 1053	449	Amdex 700/710	429/499
Toshiba 1340	599	Amdex 722	539
Toshiba 341	999	Toshiba 121/122	139/145
Toshiba 351	1149	Toshiba 820/840	295/495

Call Toll Free 24 hrs Every Day
800-662-2686 orders only
for Ca. Orders, Tech Support, Price Quotes, Info
415-668-9350 9-5 pacific time, m-t
Call or Write for Free Catalog

REBATE: New Micro-Cap, Caden's Checks, Personal Checks with 2-ml. Ink. Quiltec® 100. No fee for small orders. Ca. residents add sales tax.
SHIPPING: \$5 ground—25 per order. 3d. m. 1993 to 3d. order over \$1000.
US. Res. add sales tax. 1993 to 3d. order over \$1000. Prices
subject to change without notice.

All Products New with full warranties.
Price is available subject to change without notice.

THE BAY
Express
COMPANY

THE
BEST
PRICES

THE
BEST
SERVICE

CIRCLE 107 ON READER SERVICE CARD


```

SKIP -1
STORE &FIELD TO C
STORE (B+C)/2 TO MEDIAN
ELSE
GO TOP
SKIP INT(MM)
STORE &FIELD TO MEDIAN
ENDIF
STORE HIGH-LOW TO RANGE
STORE SUM/A TO MEAN
STORE (TSUM-BSUM)/(N/2) TO SD
STORE SD*SD TO VARIANCE
@ 11,1 SAY 'RESULTS'
@ 13,1 SAY 'NO. OF ENTRIES'
@ 13,19 SAY A
@ 14,1 SAY 'HIGHEST VALUE'
@ 14,19 SAY HIGH
@ 15,1 SAY 'LOWEST VALUE'
@ 15,19 SAY LOW
@ 16,1 SAY 'RANGE'
@ 16,19 SAY RANGE
@ 17,1 SAY 'SUM'
@ 17,19 SAY SUM
@ 18,1 SAY 'MEDIAN'
@ 18,19 SAY MEDIAN
@ 19,1 SAY 'MEAN'
@ 19,19 SAY MEAN
@ 20,1 SAY 'STANDARD DEVIATION'
@ 20,19 SAY SD
@ 21,1 SAY 'VARIANCE'
@ 21,19 SAY VARIANCE
RELEASE FILE, FIELD, A, SUM, R, LOW, BSUM, HIGH, TSUM, MM, B, C
RELEASE MEDIAN, MEAN, SD, VARIANCE, RANGE
USE
RETURN
*EOF DESCRIP.PRGM

```

(Figure 1 ends)

For additional statistical/mathematical aid, see the *SQLRT.PRG* listing in the *Power User* column, *PC Magazine*, Volume 4 Number 23. This program automatically calculates the square root of any number input at dBASE's command line from the keyboard or by a program. Together, *SQLRT.PRG* and *DESCRIP.PRG* turn dBASE II or III into quite a useful statistical tool.—David Obregon

dBASE Speed Tips

I'd like to share a few tips that help shave off every possible microsecond from your dBASE II or III command files. While some of the more general suggestions may contradict everything you've ever learned about writing dBASE programs, they cut the execution time for your programs to the bare minimum.

It is important to note that code-optimizing measures like these should not be

used if program readability is important. Your applications should be thoroughly debugged and tested before you implement the following procedures. With complicated programs, however, the cumulative effect these steps can have on the speed of operation is impressive.

1. Left justify everything: No indentations for IFs, DO CASEs, or DO WHILEs.
2. All field, variable, and filenames should use as few letters as possible.
3. Locate those fields used in indexing, sorts, or LOCATES at the top of your data files' structures.
4. Eliminate all comment lines (any line starting with *).
5. Use commands such as SET TALK OFF and SET CONSOLE OFF when you don't need messages, preventing unnecessary use of the processor.
6. Trim line lengths by eliminating

spaces wherever dBASE allows. For example, turn

```
DO WHILE K = 5 .AND. I = "HOM"
```

into

```
DO WHILE K=5.AND.I="HOM"
```

7. Delete redundant statements such as a GO TOP after a USE <filename> command, a CLEAR GETS after ERASE, or LOOP as the last line of a DO WHILE routine.

8. Use capital letters as much as possible. Lowercase letters take a little longer to identify.

9. Take advantage of the fact that dBASE only reads the first four letters of a command. Never use APPEND where APPE will suffice.

Troy Hammond
Houma, Louisiana

The above tips can indeed speed up long programs, far in following them, you are basically stripping the code of extraneous space in exactly the same manner as dBASE itself would do internally. Compressing your code according to these suggestions sidesteps that action within dBASE, and things happen faster.

Making use of SET TALK OFF and SET CONSOLE OFF while your program is running can, by itself, dramatically increase the throughput of your programs. But beware: If your program has bugs in it and you've turned off the screen's error messages, you'll never know it. Also, don't follow these tips with programs that might have to be read and modified by others somewhere down the line (please!).

—David Obregon

Using Numeric Fields

in dBASE III Text

dBASE's PICTURE command works well for inputting numerically formatted data to be printed in tabular reports. However, it leaves blank spaces in the field when the number doesn't fill the field completely. For this reason, PICTURE doesn't work very well in applications where you need to drop the numbers into the middle of text.

This difficulty can be overcome by converting the number to a trimmed character string. After doing so, however, you'll


```
* This program will convert AMOUNT (a numeric field or memory
* variable with two decimal places) into the string variable
* MONEY for printing in text material.
*
* Leading blanks are removed and commas are inserted.
*
* NOTE: This routine can not process numbers > 99,999,999.99.
* Numbers < .01 will be rounded to 2 places.
```

```
* declare public memory variable MONEY so that results can
* be passed back to the calling program
```

PUBLIC MONEY

```
* convert numeric variable into string, insert commas and decimal point
```

```
MONEY = SUBSTR(STR(AMOUNT*100),1,2) + ",";
+ SUBSTR(STR(AMOUNT*100),3,3) + ".";
+ SUBSTR(STR(AMOUNT*100),6,3) + ".";
+ SUBSTR(STR(AMOUNT*100),9)
```

(Figure 2 continues)

Figure 2: DOLLARS.PRG converts and properly formats numbers into dollar amounts for printing.

CADD for \$99.95

GENERIC CADD is a sophisticated and easy to use Computer Aided Drafting/Design program for PCs.

GENERIC CADD Features:

- Drawing Layers
- Component Libraries
- Rubber Banding
- User-Defined Menus
- Video & Digitizer Menus
- Supports most popular digitizers, mice and plotters
- Line Edits
- Color Graphics
- User-Defined Fonts
- Window Edits
- Unlimited Drawing Size

Other Available GENERIC Software:

- AUTOCAD™ file conversion for \$24.95
- Dot Matrix printer/plot option for \$24.95

Call 1-800-228-3601 to order

MC, VISA, COD. Add \$3.00 for shipping
60 day money back guarantee
GENERIC SOFTWARE
6 Lake Bellevue, Suite 203
Bellevue, WA 98005
(206) 462-1944

DISKETTES

Ask about our monthly "SPECIAL"

Dysan 5 1/4 Disks S-SIDE 13.95 D-DEN 13.95 D-SIDE 18.95 D-DEN 18.95 S-SIDE 23.95 D-DEN 23.95 S-SIDE 29.95 D-DEN 29.95 HIGH DEN 39.95 3 1/2 Disk S-SIDE 24.95 D-DEN 24.95 8 Disks S-SIDE 20.95 D-DEN 20.95 S-SIDE 22.95 D-DEN 22.95 D-SIDE 27.50 D-DEN 27.50	maxell 5 1/4 Disks S-SIDE 9.95 D-DEN 9.95 D-SIDE 14.75 D-DEN 14.75 S-SIDE 19.95 D-DEN 19.95 S-SIDE 24.50 D-DEN 24.50 HIGH DEN 28.75 3 1/2 Disks S-SIDE 18.40 D-DEN 18.40 8 Disks S-SIDE 26.95 D-DEN 26.95 S-SIDE 24.95 D-DEN 24.95 D-SIDE 26.95 D-DEN 26.95	SONY 3 1/2 Disks S-SIDE 18.95 D-DEN 18.95 D-SIDE 28.95 D-DEN 28.95 ATHANA 5 1/4 Disks S-SIDE 10.95 D-DEN 10.95 D-SIDE 15.25 D-DEN 15.25 S-SIDE 19.95 D-DEN 19.95 S-SIDE 24.50 D-DEN 24.50 HIGH DEN 30.95 3 1/2 Disks S-SIDE 19.95 D-DEN 19.95 S-SIDE 27.95 D-DEN 27.95 8 Disks S-SIDE 19.95 D-DEN 19.95 S-SIDE 23.95 D-DEN 23.95 S-SIDE 27.95 D-DEN 27.95 Media Matte 5 1/4 Disks S-SIDE 27.95 D-DEN 27.95	3M 5 1/4 Disks S-SIDE 10.95 D-DEN 10.95 D-SIDE 15.25 D-DEN 15.25 S-SIDE 19.95 D-DEN 19.95 S-SIDE 24.50 D-DEN 24.50 HIGH DEN 30.95 3 1/2 Disks S-SIDE 19.95 D-DEN 19.95 S-SIDE 27.95 D-DEN 27.95 8 Disks S-SIDE 19.95 D-DEN 19.95 S-SIDE 23.95 D-DEN 23.95 S-SIDE 27.95 D-DEN 27.95	Verbatim 5 1/4 Disks S-SIDE 11.75 D-DEN 11.75 D-SIDE 14.95 D-DEN 14.95 S-SIDE 19.95 D-DEN 19.95 S-SIDE 24.50 D-DEN 24.50 HIGH DEN 29.95 3 1/2 Disk S-SIDE 18.95 D-DEN 18.95 8 Disks S-SIDE 19.95 D-DEN 19.95 S-SIDE 21.95 D-DEN 21.95 S-SIDE 24.95 D-DEN 24.95
--	--	--	---	---

Old Reliable **Disette Connection** 

• Delaware 1-800-451-1849
• Oklahoma 1-800-654-4058
• Nevada 1-800-621-6221

TERMS: Minimum 20 disks or \$35.00 — VISA or MasterCard accepted
COD orders add 2% for special handling SHIPPING 3% a 5% Diskettes
Add 3% for every 100 Diskettes or any fraction thereof 8 Diskettes. Add
4% for every 100 Diskettes or any fraction thereof. We ship UPS, orders
requiring other delivery methods add shipping plus 2% of total order.

* strip leading blanks and commas

```
DO WHILE SUBSTR(MONEY,1,1) = " " .OR. SUBSTR(MONEY,1,1) = ",",
  MONEY = SUBSTR(MONEY,2)
ENDDO
```

* if money < .1 insert missing 0

```
IF SUBSTR(MONEY,1,2) = ". "
  MONEY = SUBSTR(MONEY,1,1)+"0"+SUBSTR(MONEY,3)
ENDIF
```

* EOF DOLLARS.PRG

(Figure 2 ends)

also need to add commas and retain decimal points before you put the converted numbers into form letters and other text. The DOLLARS.PRG shown in Figure 2 can perform both the conversions and reformatting for you automatically.

Incidentally, you can actually produce simple form letters entirely with dBASE.

III. By using the SET MARGIN TO command and the TEXT/ENDTEXT statements, you can create a program that produces a convincing form letter without resorting to external word processing programs.

Robert B. Calvert
Charlotte, North Carolina

Figure 2 lists the DOLLARS.PRG code for dBASE III. I've modified the original submission slightly to add a dollar sign to the number automatically. If you don't need a dollar sign, ignore the last line of code. Unfortunately, I could not come up with a similar dBASE II solution.

You can indeed use TEXT/ENDTEXT

Upgrade Your PCjr

J & M Systems' PC2C disk controller allows you to add up to two external floppy drives to your PCjr to be used in addition to the internal drive. It is a user-installed board which replaces the IBM controller. Prerequisite: DOS 2.1

Our drive systems include the PC2C controller, a two-drive cable, 360 K half-height DSDD drive(s) in case and with power supply, and software for operating the extra drive(s) — everything you need!

PC2C with 1 drive	\$295
PC2C with 2 drives	\$449
PC2C controller & software	\$149



15100A Central SE, Albuquerque NM 87123
(505) 292-4182

Visa & MasterCard Accepted

CIRCLE 491 ON READER SERVICE CARD

DISK MECHANIC

The ULTIMATE Backup, Analyze & Repair Utility
The Disk Toolkit NO IBM PC Should be Without
Protects Your Software Investment

BACKUP TOOLS:

- Can Backup Most Every Diskette
- SUCCEEDS where others fail!
- Works Manually or Automatically
- Creates "Protected" Diskettes
- Many Additional Analysis Tools

SECTOR TOOLS:

- Examines/Print Sector Data
- Modify (ZAP) Sector Data
- Compare, Copy & Zero Sectors
- Search Sectors For Data
- Search Sectors For Data

FILE TOOLS:

- Show Disk & File Allocation
- Display & Alter File Data
- Repair Damaged Disks
- Recover Erased Files
- Alter "Hidden" Status
- Search Files For Data

HACKER TOOLS:

- Modify Floppy Disk Controller Parameters
- Supports All FDC R/W Commands

DISK MECHANIC works with all standard IBM PC disk formats including "protected" diskettes with mixed track and sector sizes, blank and high track formatting, CRC errors, and single or double sided drives. DISK MECHANIC requires an IBM PC with 128K of memory or COMPAQ with 192K of memory, DOS 1.10, and 2 floppy disk drives. DISK MECHANIC includes a detailed 48 page instruction manual. To Order DISK MECHANIC send check or money order for \$79 plus \$3 for shipping (Mass. res. add sales tax.) to: MLI MICROSYSTEMS, Box 825, Framingham, Mass. 01701 or Call (617) 926-2655 for MasterCard or VISA orders. Dealer/Distributor inquiries welcome. ©1983 MLI MICROSYSTEMS.

MLI MICROSYSTEMS

CIRCLE 344 ON READER SERVICE CARD

and SET MARGIN TO to create programs for form letters in either dBASE II or III. However, any macros embedded within the text block defined by TEXT/ENDTEXT will not be expanded, since dBASE ignores everything within these bracketing statements. To insert the converted numbers created by DOLLARS.PRg in your dBASE form letters, then, you must use @ SAY (or AT SAY) statements instead, before or after the TEXT/ENDTEXT statements.

Power Footnotes in Word

Microsoft Word has a number of standard features that, with a little imagination, are easily adapted to other uses. For example, my work often requires that the draft text I create be interspersed with references to a sequential set of illustrations. To keep the sequence straight, I combined Word's glossary and footnote features.

I created a glossary entry with the name "fig" that includes the text "Figure Z-", where "Z" refers to the chapter I'm working on and can easily be changed for each chapter. Immediately after inserting this text (using the F3 key to expand the glossary name), I invoke Word's Format Footnote command, which generates a sequential footnote number after the dash. I can then describe the figure in the footnote (or endnote when that's preferable).

This technique saves me from having to worry about which figures go with which references, and what sequence they are in. If I delete one footnote, Word's footnote facility automatically rennumbers the rest of them for me. In some applications, the glossary entry also includes the special character ("&") that is required by my typesetting system.

Rick Liftig
Meriden, Connecticut

I like simple solutions that work. This one can be used with almost any document that requires internal sequencing of references that are not actually footnotes. Automatic renumbering keeps everything lined up correctly when references are deleted. Any word processing program that has a good footnoting system can be used in the same way.—John Dickinson

Share Your Power

Tell the world about your latest technical tips for hardware and software applications through Power User, and we'll pay you \$50 for your trouble, plus an extra \$25 if you submit it on a disk.

If you send a disk, please include a printout of your submission to ensure against damage in transit. Mail your contributions to: Power User, PC Magazine, One Park Avenue, New York, NY 10016. ■

THE BEST PC TEXT EDITOR JUST GOT BETTER. ANNOUNCING SPF/PC™ 1.82

The best full screen editor for the IBM PC now extends support for large files to all PC's, not just the IBM/AT. Invoke your favorite program/compiler from within Edit at any time regardless of file size. CTC's SPF/PC™ 1.82 still looks like its mainframe cousin but executes faster with more options.

NEW FEATURES

- **PAGING** - Editing limited only by capacity of expanded/extended memory or hard disk.
- **SPEED** - Search 1,500,000 byte file with IBM AT in less than 13 seconds. By comparison, the IBM 3081 mainframe takes 48 seconds.

\$195

UPGRADES only \$50
ADD \$6 shipping
Canada \$10, Foreign \$15



Payment in U.S. funds by check or bank wire (Bank of America, San Francisco account 05583-05454).
Net 30 to D&B rated firms.

- Compatible with IBM and Novell Networks
- Modifiable HEX display
- Line length to 954 bytes

Minimum Requirements:
DOS 2.00-3.10, 192KB memory,
any IBM PC or true compatible
or TI Professional.



Command Technology Corporation
1900 Mountain Boulevard
Oakland, California 94611

TO ORDER
SPF/PC.....

Telephone: (415) 339-3530
Telex: 509330 COMMAND TECH

CIRCLE 164 ON READER SERVICE CARD

Confidence Game.



It's knowing that the friendly voice at the other end of the line understands what you're saying. Can answer your technical questions, verify prices and shipping schedules. Or make good suggestions.

Join the Micro Mart Confidence Game.

Trust Micro Mart for immediate information and advice on almost any micro-computer product. Our 15 million dollar inventory is on-line to our mainframe so we can verify, order, deliver and service. Without delay.

Call us with confidence.

COMPUTERS

AT&T Color and Mono Systems in stock **Start at \$1795**

MULTIFUNCTION BOARDS

We have a complete line of Multifunction Boards compatible with the Portable, XT/AT

SIX PAK 64-384K, multifunc. **I/O MINNIE I/O** shortboard for Portable & AT **New Low Price**

ADVANTAGE 128K-3Mb, expansion for AT

QUADRAM Quadboard Loaded, 384K **\$269**

QUADRAM Goldboard, 384K **\$459**

TECMAR Captain 0-384K, multifunc. **\$175**

TALLTREE J-RAM II **New Low Price**

GRAPHIC CARDS

HERCULES Mono & Color Graphics cards **New Low Price**

TECMAR Graphics Master, HiRes Color & Mono supports Lotus **\$449**

QUADRAM Quadcolor I & II color cards

PARADISE Multi-display or modular graphics cards **From \$199**

STB Chaffeur & Colorific **\$299 & \$189**

SIGMA Color 400 for PGS SR-12 **New Low Price**

FLOPPY DISK DRIVES

TANDON TM 100-2, DODS, 360K **New low, low price**

1/2 HEIGHT Disk Drives from Shugart, Mitsubishi, TEAC and Toshiba. PC, XT & AT Compatible **From \$99**

BEST SUPPLY ON EAST COAST

HARD DISCS

IRWIN/TANDBERG Tape back-up systems **From \$495**

SEAGATE Fast 10, 20, 30 and 75 Meg. for PC & AT **From \$495**

SYSGEN Complete line **Call**

for our special Sygen pricing!

BERNOULLI TECHNOLOGY Hard disc Subsystems **From \$2595**

PRIAM Superfast 40 & 60 Meg. for AT **Call**

Best availability of voice coil and stepper motor hard drives with high quality controllers **From \$495**

SOFTWARE

ACCOUNTING SPREADSHEETS & INTEGRATED PACKAGES

SORCIM/IUS Complete line including Windows **From \$289/each**

SORCIM SuperCalc 3, vers. 2.0 **New Low Price**

ENHANCEMENTS & UTILITIES

FOX & GELLER Complete line for dBase II/III, RBase 4000

NORTON Utilities 3.0 **\$89**

ROSESOFT ProKey 3.0 **\$89**

CENTRAL POINT SOFTWARE Copy II PC **\$35**

STYLISTE Set FX+ and Printworks, printer control

NORTHWEST Inverts printout **\$35**

BORLAND SideKick and SuperKey **From \$40**

COMPILERS & LANGUAGE TOOLS

LATTICE C-Compilers **\$279**

MICROSOFT Complete line

MICROSOFT QuickBasic **New Low Price**

BORLAND Turbo Pascal, Turbo Toolbox & more **From \$35/each**

GRAPHICS

Z-SOFT PC Paintbrush, mouse graphics **\$95**

DECISION RESOURCES

ChartMaster... Latest Version **\$239**

MICROSOFT Chart **\$169**

COMMUNICATIONS

MICROSTUF Crosstalk XVI, Latest version **\$99**

HAYES Smartcom II **\$85**

WORD PROCESSING

MULTIMATE w/spelling checker & tutorial **New Low Price**

SAMMA+ **\$350**

MICROSOFT Word, new version **New Low Price**

LIFETREE Volkswriter Deluxe **\$169**

SSI WordPerfect, version 4.1 **\$249**

MICROPRO WordStar Professional series **New Low Price**

NETWORKING/PROTOCOL CONVERSION

SNA & BSYNC 3780, 5251, Mod 11 & 12, 3274, 3278

PC TURBO 186/187 board, 128K, 8087 Serial Board attached **\$875**

IRMA Complete line **From \$449**

TECHLAND Blue Lynx. Complete line **Call**

PRINTERS

We have thousands in stock.

DOT MATRIX

EPSON FX85/185 **NEW!**

EPSON LX80/LQ1500

DKIDATA 192 & 193, ML84, Pacemaker 2410

TOSHIBA P-341, P-351 & 1340 **New Low Price**

NEC New P-5 **Introductory Low Price**

LETTER QUALITY

NEC Spinwriters 2050, 3550, 8850 **New Low Price**

EPSON DX10, DX20, & DX35 **New Letter Quality Printers!**

We carry a full range of form handling options.

CHIPS

All our chips are tested and priced for quick sale. Call us!

INTEL 8087, 80287, high speed coproc. **From \$119**

64K-256K RAMCHIPS **Call for Market Price.**

128K Piggy-back chips for your AT **Call for Market Price.**

MODEMS

HAYES Smartmodem 300, 1200, 1200B & 2400. We have the best stock in the USA **Call**

VEN-TEL 1200 Baud Half Card w/Crosstalk **\$399**

PEACHTREE TECHNOLOGIES P-1200 ext. with Crosstalk **\$319**

MISCELLANEOUS

MAXELL Diskettes **\$25**

DYSAN Diskettes at the lowest price in the USA **Call**

MOUSE SYSTEMS PC Mouse, optical w/software **\$139**

MICROSOFT Mouse, bus or serial mechanical. New Model in Stock

KEYTRONICS 5151 keyboards **\$149**

KENSINGTON MICROWARE MasterPiece **\$99**

CURTIS Accessories, Pedestals, cables, etc.

GRAVIS Joysticks **\$45**

QUADRAM Microfazer print buffer 8-128K **From \$129**

TRIPP-LITE ISOBAR surge protectors, 4 & 8 plug **From \$49**

POLAROID Palette **\$1245**

MONITORS AND CRTS

PGS Max12 (E), HX12, HX12(E), & SR-12 **New Low Price**

QUADRAM Quadchrome, 680 dot RGB **\$429**

AMDEK Color 600 **\$379**

AMDEK 722, New alternative to IBM enhanced monitor **\$569**

AMDEK 300A/300G/310A **\$129/\$119/\$165**

©Copyright 1985, Micro Mart, Inc. Technology Corporate Campus

3159 Campus Drive Norcross, Georgia 30071

Prices are subject to change without notice and are similar, but may vary at over 20 Micro Mart Retail Stores.

Leasing and financing options are available. MasterCard/VISA or ask for Micro Mart Blue Chip Credit.

PM 1-86



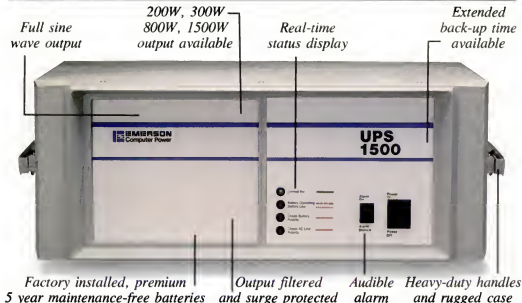
(404) 449-8089

Orders only

1-800-241-8149

MICRO MART
America's PC Specialist

"Power Protection"



Announcing: AP1000 Series UPS Full sine wave UPS for low power applications from Emerson, the Technology and Price Leader in Uninterruptible Power Systems

Your electronic equipment depends upon clean uninterrupted power. If that power is disturbed by "Black-outs", "Brown-outs", Spikes or Surges, your equipment could be damaged and memory lost. Your valuable system becomes worthless.

Do you have these?

P.C.'s, office computers, ATM's, PBX's, Point of Sale Terminals, Security Systems, or Test Equipment. They could be vulnerable to power-line disturbances.

Now they can be economically protected with the new Emerson AP1000 Series UPS with power ratings from 200-1500 watts and starting at \$379. From 200VA to 4,000 KVA, Emerson has you covered.

For a free Technical Brochure and the Distributor/Dealer nearest you, call toll free 1-800-BACK-UPS. Emerson Computer Power, 3300 S. Standard St., Santa Ana, California 92702.

CALL
1-800-BACK-UPS
For Your Free
Technical
Brochure



EMERSON
Computer Power



User-to-User

Readers share their favorite tricks for getting the most out of DOS, BASIC, and their systems in general.

Batch Logs

In developing a large software project you're likely to end up writing a complex batch file to handle all the compiles, assemblies, and links required. Sitting around for hours monitoring the batch file to make sure everything works properly isn't much fun. It would be handy if all the output from a batch file could be redirected to a file to be inspected later. Unfortunately, you can't do it simply by redirecting the output of the master batch file:

```
build.bat > logfile
```

However, I've found a somewhat obscure way of doing the same thing. First, make the very last line of your batch file the DOS command EXIT. But before running this batch file, load another copy of COMMAND.COM and redirect its output to your log file:

```
command >logfile
```

With this trick all screen output is redirected to your log file. However, since the DOS prompt disappears and your typing will no longer echo on the screen, be sure to type the name of your batch file carefully, since you can't see it. All the output of the batch file will now go into your log file and the EXIT command at the bottom of your batch file will return everything to normal.

Alan Groupe
Reading, Massachusetts

This technique demonstrates yet another benefit of loading COMMAND.COM as a secondary command processor. An even more interesting one is during a session with a windowing program that doesn't normally give you access to DOS commands. By the way, it's fairly simple to record a batch session without loading in a second COMMAND.COM: just toggle your printer echo on with Ctrl-PrtSc or

Ctrl-P and everything that appears on the screen will also be printed. When you're done, toggle it off the same way.

Spaced Out

DOS uses a space character to delimit its commands and operands. If a space is part of a filename, DOS will become confused. If you enter

```
COPY A:MY PROG.BAS B:MY PROG.BAS
```

DOS will assume you want the program called MY on drive A: copied to the default drive using the filename PROG.BAS and will ignore the B:MY PROG.BAS completely.

Many otherwise excellent programs, such as PC-TALK can allow an unsuspecting user to create filenames containing spaces. This is because assembly language uses an apostrophe, a comma, or a zero to delimit filenames. Similarly, BASIC uses quotes to delimit its filenames.

Most programs that allow you to create filenames containing spaces will also allow you to read those files. However, if you try to perform certain DOS-level operations such as COPY or RENAME on these files, you will either not succeed or will make a confused mess of your files. In addition, while the DOS DIR command can at least read filenames with spaces, BASIC's FILES command will display the filename only up to the space character.

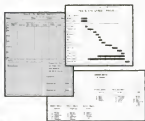
If you do create filenames containing spaces, there are three methods you can use to remove the space or rename the file completely. Let's assume you have a file called "PROG 1.BAS" and you want to call it "PROG-1.BAS".

Method 1 (DOS): Use the wildcard character '?' and the DOS RENAME command

```
REN PROG?1.BAS PROG-1.BAS
```

Method 2 (BASIC): Use the BASIC

AT LAST, EASY, PRACTICAL GRAPHICS WITH OR WITHOUT A GRAPHICS BOARD



INTRODUCING
MONOGRFX™
ONLY \$69.95

- ✓ Makes it easy and inexpensive to create organizational diagrams, Gantt charts, everyday business forms and other free-form line and block drawings on your IBM PC.
- ✓ Lets you quickly dress up any report or overhead presentation with impressive text charts, numerical tables, bar graphs, etc.
- ✓ Uses three different character sizes (in normal or condensed print) on sheets as large as 11" x 14".
- ✓ Integrates graphics and text.
- ✓ Supports most popular printers and nearly all monochrome/color graphics display adapters.
- ✓ Is truly simple to learn and use.

TRY IT RISK-FREE!

Send \$69.95 — or \$99.95 for an unprotected version — plus \$3 shipping (\$10 outside U.S. and Canada) to the address below (Mass. residents, add 5% sales tax).

MasterCard and VISA orders, CALL TOLL-FREE 1-800-992-0085. (In Massachusetts, dial 617-641-0400.)

We'll rush you your MonoGrafx software package right away. If you're not completely satisfied, just return it within 15 days of delivery for a full, unquestioned refund or credit. Our guarantee is that pure and simple.

- ☐ YES, please rush me MonoGrafx (version 2.1) to try risk free for 15 days. My check, money order or company PO is enclosed.
- ☐ I'm interested. But first, I'd like to review your demo disk and print samples. Enclosed is \$5 for a complete Evaluation Kit.

Name _____
Address _____
City _____
State _____ ZIP _____

Phone () _____ Ext. _____
IBM PC is a registered trademark of International Business Machines Corporation.

Analytics International, Inc.
130-5 Massachusetts Avenue
Arlington, MA 02174

CIRCLE 482 ON READER SERVICE CARD

Nationwide third-party carry-in

Service by Servnet

What an innovation. Combining mass-market discounts with nationwide third-party service.

This covers standard products, like IBM and Compaq, along with our more specialized products like Cranium and Otari.

Servnet is not just the biggest, but their flexibility and rational business methods will leave you smiling.

What does this mean for the future of the PC's? (Just Price Computer Stores.) Maybe they can stay in business selling off their used carpet.

Cranium 286 / 10 10 MHz "AT"

"World's production AT" Computer System



■ Made in U.S.A. ■ Compatible DOS 3.1, Unix, Lotus 1-2-3, etc. ■ Service through Servnet. ■ All components are interchangeable with IBM modules. ■ Keyboard is sold without tactile "click", click style may be ordered, add \$35. ■ 640K RAM, 12 MByte floppy 20 MByte hard, mono-graphics with green CRT. ■ Sockets crystal. ■ 80287 optional.

The Cranium 286 / 10 rates best in 5 major categories. BEST service network. BEST installed hard disk. BEST power supply. BEST compatibility, runs 3 kinds of Unix and 6 kinds of "C" language. BEST ratio of performance to price.

\$3050

Does the video? 40 Mbytes or larger drive? We configure your way. And don't forget our famous 2 week return privilege.

Cranium XT Low cost, but highest quality.

■ 8 slot, 135W, 256K ■ Highly compatible ■ "AT" style keyboard without tactile "click", click style, add \$35 ■ Service by Servnet ■ Hercules type video interface ■ High resolution green monitor ■ 360K floppy ■ 10 MByte hard disk.

XT 2 floppies... \$ 875

XT 10MByte, 1 floppy... \$1195

XT 20MByte, Otari, 2 h/h floppies... \$1345

6 function multifunction card with 360K RAM, 1 serial, 1 parallel, and clock with battery (on same order with XT)... \$135

Otari 20 MByte Zero-Defect Drives

Big-volume OEM's have now been testing these drives for months. Their comments:

"...solid beyond solid, excellent beyond excellence."

"Clearly more durable than drives costing twice as much."

■ 5 1/4" drive full height ■ 40 ms average access.

■ 1 year warranty service by Servnet ■ Made in Japan

Most drive manufacturers ship drives with known bad sectors! No surprise the Japanese are conquering the market with quality and price.

AT with rails, data cable... \$425
XT with standard controller... \$625
XT w/combined floppy-hard controller... \$725

ABM

Non-volatile "Lotus-Intel" 2MByte RAM, Advanced Multifunction Card

■ Switchless configuration ■ Up to 2 MByte "Lotus-Intel spec" non-volatile RAM. ■ Error correcting RAM-disk. ■ Pop-up windowing spooler. ■ Clock, parallel, serial, game. \$485 with 2MByte

SONY KV-1311 CR

High performance color monitor & Remote control television

■ 13" Trinitron, fine pitch, low distortion design. ■ 2 RGB inputs, digital and analog. ■ Composite video input. ■ Antenna input including cable channels 1-125. ■ Internal speaker and audio jacks. ■ Includes PC RGB cable and wireless remote control. \$479

EVEREX "THE EDGE" VIDEO CARD

Color or Monochrome/16 Colors or Shades
132 column text mode. Printer port. \$299

ETERNITY-100 100 MByte LASER DISK SYSTEM

■ Removable "Write Once" cartridges give permanent tamper-proof storage. ■ PC and AT compatibility DOS 2.1, DOS 3.1, and Zenix. ■ 5 year extended warranty add \$200. ■ Standard 5 1/4" size drive can mount internal. ■ Service by Servnet. ■ Extra cartridges, \$125 each. Were you waiting for the price to drop? It just did. Now only \$2450 internal. \$2650 external.

HARD DISKS

Seagate 20MByte half-height with controller \$485

Seagate 31MByte full height... \$785

Seagate 44MByte full height... \$875

Memiscube 44MByte full height... \$1095

Tall Tree JLASER Laser Printer Interface

■ 300 x 300 dots per inch, full page graphics. ■ IBM PC and AT compatible. ■ 8 pages per minute using Canon engine. ■ May be attached to HP LaserJet. ■ Fonts and symbols loaded from disk, not cartridge.

Evaluation units are available, primarily to software developers. We request 10% deposit to secure your order. Estimated shipment is 2 to 4 weeks ARO. We are still evaluating software to bundle for general use and request that non-technical users place their orders for delivery in 4 to 8 weeks.

JLASER with engine... \$3100
JLASER, no engine... \$850

HEWLETT-PACKARD LASER JET PRINTER

\$2295
LASER JET PLUS
\$3095
Extra laser cartridge, \$20

PRINCETON HX-12E COLOR MONITOR



■ 12" RGB monitor with IBM-style cabinet. ■ Two modes: Standard color 640 x 200/Enhanced Color Graphics mode, 640 x 350. ■ Automatically syncs to either signal—no adjustments required. ■ 28mm dot pitch, high brightness phosphors. \$475

WE'RE WORKING OVERTIME

We're working two shifts, 7 days a week.

To help us catch up, please give two phone numbers, day and evening. We will honor specific limits, like "don't call after 10 PM" or "don't call on Sunday."

Your cooperation is appreciated.

IBM Computers

IBM PC system... \$1750

■ 360K floppy ■ 256K RAM ■ Mono-graph video ■ Printer port

■ Green CRT

IBM XT system... \$2340

■ 360K floppy ■ 10 MByte hard ■ 256K RAM ■ Mono-graph video

■ Printer port ■ Green CRT

IBM AT system... \$3650

■ 1.2 MByte floppy ■ 20 MByte hard ■ 512 RAM ■ Mono-graph video

■ Printer port ■ Green CRT

TRIAL PERIOD GUARANTEE

Use any item 7 weeks. If you don't want it, send it back. You will receive a complete refund, minus \$20 enclosing charge and actual shipping charges, except for unused damage.

TERMS

Pay with check, cashiers check, Visa or Mastercard. Charge cards, add 2% Government and school PO's, add 2% handling.

ONE
COMPUTER
CORP.

11926 Santa Monica Blvd.,
West Los Angeles, CA 90025
(213) 207-9554

USER-TO-USER

NAME command, which uses quotes as a delimiter and isn't confused by space characters

```
NAME "PROG 1.BAS" AS "PROG-1.BAS"
```

Method 3 (Assembly Language): Use the DOS 2.0 function 56h "Move Directory Entry"

```
AH = 56h
DS:DX = Address of ASCIIIZ
        pathname for existing file
ES:DI = Address of new
        pathname
```

Baron L. Roberts
Mountain View, California

An interesting BASIC bug that's actually a feature. BASIC really shouldn't allow the creation of DOS files with spaces inside them, but since it does, it can also correct space/filename errors.

Maximum Function

BASIC lacks two very fundamental functions—maximum and minimum. Instead of using repetitive IF . . . THEN . . . ELSE statements, I've devised two user-defined functions to handle this for me (see Figure 1).

As an example, if I wanted to create a formula "Principal payment = Cash flow

available—Interest" but had to be sure the principal payment could not be negative and could not be greater than the loan opening balance, I would create the following line:

```
PRIN=PRMIN( (PNNAX*(CF-18TRST) ), 0), LOAN)
```

Mrs. Kim Hoang
Calgary, Alberta
Canada

This also deftly demonstrates a use of nested defined functions and shows how versatile and friendly BASIC can be for serious business applications.

Better Pauser

Often when writing a batch file I'll need to have the computer stop and wait for a key. While the DOS PAUSE subcommand will do this, sometimes I don't want the "Strike a key when ready . . ." message to be displayed. A friend of mine wrote a program called STOP.COM that can replace the PAUSE command. You can instruct STOP.COM to proceed when any key is pressed, or wait for a specific key (extended codes are allowed). To create STOP.COM, just type in and run the STOP.BAS program (see Figure 2). STOP.COM will be either 11 or 19 bytes long, depending on your choice of trigger

```
100 'MINMAX.BAS -- by Kim Hoang
110 DEF FNMAX(V1,V2)=INSTR(STR$(V1-V2),"-")*V2+(1-INSTR(STR$(V1-V2),"-"))*V1
120 DEF FNMIN(V1,V2)=INSTR(STR$(V1-V2),"-")*V1+(1-INSTR(STR$(V1-V2),"-"))*V2
130 A=10:B=40:X=FNMAX(A,B):PRINT "A=";A,"B=";B,"MAX(A,B)=";X
140 A=-20:B=10:X=FNMIN(A,B):PRINT "A=";A,"B=";B,"MIN(A,B)=";X
```

Figure 1: Program to illustrate user-defined minimum and maximum functions.

```
100 'STOP.BAS -- by Lawrence Ludden, 11
110 DIM D(19):FOR Y=1 TO 11:READ D(Y):NEXT:DEF SEG=6448
120 PRINT "Type specific key or '?' for any key"
130 LY$=INKEY$:IF LY$="" GOTO 130
140 TL=PEEK(36):TL=TL-2:IF TL<0 THEN TL=60
150 CL=PEEK(TL):C2=PEEK(TL+1)
160 IF CL<0 THEN 190
170 S1=19:FOR Y=10 TO 19:READ D(Y):NEXT
180 D(15)=C2:D(6)=60:D(7)=0:GOTO 200
190 S1=11:IF CL<63 THEN D(6)=60:D(7)=CL
200 OPEN "STOP.COM" AS #1 LEN=1
210 FIELD #1 AS PUS
220 FOR Y=1 TO S1:LET PUS=CHR$(D(Y)):PUT #1:NEXT
230 PRINT:PRINT "STOP.COM was created":CLOSE #1:END
240 DATA 184,8,12,205,33,56,192,117,247,285
250 DATA 32,180,8,205,33,60,0,117,239,705,32
```

Figure 2: Program to create STOP.COM file to replace DOS PAUSE subcommand. You can customize STOP.COM to be triggered by one specific key or by any key. At the "Type . . ." prompt, either enter the specific trigger key or hit a question mark to allow STOP.COM to proceed after any key press.

DOUBLE THE OPTION CAPACITY OF YOUR IBM PERSONAL COMPUTER PC-XTRA

- DIRECT EXTENSION OF PC BUS
- NO SOFTWARE CHANGES
- NO HARDWARE MODIFICATION
- STYLING CONSISTENT WITH IBM

Add all these special options you've been wanting without worrying about fitting plug-in and back panel space.



DEALER INQUIRIES INVITED.

\$549.00* F.O.B. SANTA ANA
*CALIFORNIA RESIDENTS ADD 6% SALES TAX

PC HORIZONS, INC.

1701 E. Edinger
Suite A6,
Santa Ana, CA 92705
(714) 953-5396

CIRCLE 194 ON READER SERVICE CARD

A VISIBLE SALES STRATEGY

A classified ad in PC means a minimum investment with a high sales return in the microcomputer mail-order market! Let us give you information on ad sizes, options, rates—and you'll be amazed at how economically you can focus in on your specific audience.

PC's penetrating editorial brings you a knowledgeable readership that is rapidly growing—and growing increasingly responsive to the product or service you have to offer. And it's easier than ever to deliver your message—because you can phone your ad in at the number below, so your insertion can run in the next issue. Make sure it does—phone now!

Classified Advertising

ZIFF-DAVIS PUBLISHING COMPANY

Computer
Publications
Division

CALL 212-503-5115

USER-TO-USER

keys. Figure 3 shows the assembler code for a version that will proceed only when the F1 key is pressed.

Kathie McCoombe
Marlton, New Jersey

By creating the *STOP.COM* file and inserting the word *STOP* in a batch file, you can indeed halt the operation of the batch file without the conventional *PAUSE* message. However, you have to tell the user to hit a key, presumably with an *ECHO* subcommand, so you're really not gaining much—and you have to precede the *STOP* line with an *ECHO OFF*, or you'll see the word *STOP* on-screen.

In addition, the *PAUSE* subcommand works so well that if the "Strike..." message really bothers you, why not just change it? The message is embedded inside *COMMAND.COM*; to find it, put *DEBUG.COM* on your disk along with *COMMAND.COM* and enter *DEBUG*

COMMAND.COM. When you see the hyphen (-) prompt, type *RCX* and hit the Enter key twice to see how long your version of *COMMAND.COM* is. Then enter the following *DEBUG* search instruction:

```

XXXX:0100 B8008C MOV     AX,0C8B
XXXX:0103 CD21 INT     21
XXXX:0105 3C00 CMP     AL,00
XXXX:0107 75F7 JNZ     0100
XXXX:0109 B408 MOV     AH,08
XXXX:010B CD21 INT     21
XXXX:010D 3C3B CMP     AL,3B
XXXX:010F 75E7 JNZ     0100
XXXX:0111 CD28 INT     28

```

Figure 3: *STOP.COM* assembly language code for a trigger key of F1. You can use the mini-assembler in Versions 2.0 or later of *DEBUG* to create this file by first typing in *DEBUG STOP.COM*, then typing *A*, then just the two rightmost columns above. Finish it off by hitting the Enter key twice, then typing *RCX*, then *I3*, then *W*, then *Q*, hitting the Enter key after each. The *3B* in the *CMP AL,3B* line is the extended scan code for *F1*; to use *F2* as the trigger, replace the *3B* with *3C*, etc.

S 100 XXXX "Strike a key"

(but replace the *XXXX* with the length required when you typed *RCX*). The last four digits of the new number *DEBUG* reports are the address of the "Strike..." message—for DOS 3.1 the address would be 491E. You can use the *DEBUG E* command to replace it with something the same length, such as "Hit any key to continue" or you can blank it out if you want by entering 23 spaces between a pair of quotation marks. If the new message is shorter than the old, pad out the difference with spaces.

Faster Arrays

In several BASIC programs I'd been developing, it was necessary to load and save large arrays of numbers, which were used as sequential files. Even with my AT's RAM drive and fast processing speed, it took forever to do this.

WHAT EVERY PC-USER SHOULD HAVE ACCESS TO!

The Public Domain SW library offers over 2500 User-Supported and fully documented software programs that run on MS-DOS & PC-DOS operating systems.

Special Selected programs:

LANGUAGE PROGRAMS — (Basic, Pascal, Forth, etc.) \$32.00
UTILITY PROGRAMS — (Unprotect Software, Assembler, etc.) \$20.00
POPULAR GAMES — (Star Trek, B747, Opollo, Chess, etc.) \$24.00
DATABASE MANAGEMENT — (PC File, DBMS Group, Maillist, etc.) \$36.00

- **PC-CATALOG:** (with search & sort capability) \$7.00 + \$3.00 postage (on disk)
- **SPECIAL:** 5 disks that have been selected plus a **FREE** catalog disk
- **S1 - Games, printspooler, music, communication, etc.** \$35.00
- **S2 - Games, datebooks, disk man, graphics, etc.** \$35.00

OVER 50 NEW DISKS HAVE BEEN ADDED SINCE OCTOBER:
(over 1000 programs)

STOCK MARKET CHARTING (Great Program #133)

EDUCATION GAMES (#128)

PC-CALC (Visible spreadsheet #124)

PC-DIAL (MODEM Program #126)

HOST-CALL (Initiates & receives calls #122)

TIME & MGMT (Financial Calc, Budgets, etc. #132)

MUSICIAN (Write your own music #123) **PARTS INVENTORY** (#137)

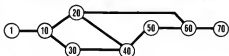
Membership: \$15.00 1 year membership includes all Public Domain SW newsletters, diskette discounts, annual catalog update

Public Domain SW
3000 Olcott St., PB-130
Santa Clara, CA 95054

Phone (408) 988-0230
(MC Visa welcome, min. CC \$14)
Shipping \$3.00 (Overseas \$10)



PROFESSIONAL PROJECT MANAGEMENT SYSTEMS



PMS-II® by NORTH AMERICA MICA, INC.

- Powerful, yet easy to use
- Unlimited multi-level networking
- Interfaces to everything
- Comprehensive reporting system
- Complete time-scaled presentation graphics available
- Full cost control — Planned & Actual
- Comparative scheduling
- Multiple-project resource and materials control add-ons
- Satisfies government specifications
- Time saving features — Spend more time managing, less time computing.

PMS-II — \$1295, Demo — \$50

Formatted for PC-DOS, MS-DOS, CP/M-86
Call for newsletter and free literature.

NORTH AMERICA MICA, INC.
5230 Carrol Canyon Rd., Suite 110, San Diego, CA 92121
(619) 458-1327

CIRCLE 526 ON READER SERVICE CARD

CIRCLE 145 ON READER SERVICE CARD

I knew BASIC could handle binary files far faster than ordinary ASCII files and decided to find a way to save the array information in binary format. The process is actually fairly simple.

First, you have to know the size of the array. This is determined by computing the product of each of the array's dimensions plus 1. For example, if an array is defined by DIM ARRAY(250,20), the actual size of the array is calculated by $SIZE = (250 + 1) * (20 + 1) = 5271$.

Next, we must determine the length of memory used to store the array. The PC uses 2 bytes to store each element of an integer array, 4 bytes for each element of a single-precision (!) array, and 8 bytes for each element of a double-precision (##) array. Therefore, the amount of memory used is calculated by computing $LENGTH = BYTES * SIZE$ where BYTES is 2, 4, or 8, depending on the array type, and SIZE is the figure computed earlier.

Finally, we must know the array's starting address—where it is located in memory. This is found by using the VARPTR function, with a statement $ADDRESS = VARPTR(ARRAY(0,0))$. It is very important to set all the program variables before calculating the ADDRESS with VARPTR, since BASIC will move the location of an array whenever it encounters a new nondimensioned variable.

After running the BSAVER.BAS program, your array will be stored as a binary file. To reload the array from the binary file, run the accompanying BLOADER.BAS program. This will work on any precision numbers and arrays with any legal number of dimensions.

Steven E. Bair
San Antonio, Texas

This technique does indeed save an enormous amount of time—and disk space. We ran a 5,000-element integer test on a PC

AT running at 8 MHz. The FILMAKER.BAS program in Figure 4 used a 250×20 loop to create a 5,000-element sequential file (called SEQFILE) consisting of the sequential integers from 1 to 5,000. It took 15 seconds to create the 38K sequential file.

The BSAVER.BAS program in Figure 5 loaded the SEQFILE sequential file in 13 seconds and wrote it back to disk as a 10K binary file called YOURFILE.EXT in just 1 second. The BLOADER.BAS program in Figure 6 reloaded the 5,000-element array from the YOURFILE.EXT file in 1 second. To test this yourself, after running the third program, type PRINT ARRAY(1,1) and PRINT ARRAY(250,20). You should see 1 and 5000 respectively. This happens so fast that you might want to verify that the array was not lurking in memory the whole time; you can do this by entering CLEAR or going in and out of DOS between program steps.

The Right Tax Software Decision The Tax Surgeon II - only \$89⁹⁵

The "Tax Surgeon II" from TAXbyte, Inc., the people who provide tax software to tax professionals, goes to work on your return the moment you input data.

The Tax Surgeon II Features:

- Simple fill-in-the blanks entry
- Full screen display of a facsimile form
- Automatic calculations and carry forward computations of preprogrammed math and tax tables
- On screen "help" messages to guide you through tax maze
- Prepares and prints up to 5 returns
- Prints on standard government 1040 page 1 and 2 forms - all other forms computer generated (IRS approved)

Requires IBM-PC, XT, AT, or PCjr (DOS 2.XX or 3.XX) or 100% compatible computer.

Prepares and Prints:

1040	SCH ES	*F2106	F4136	F6251
SCH A	SCH F	F2119	F4255	F6252
SCH B	SCH G	F2210	*F4562	W2 List
*SCH C	SCH R	F2441	F4797	
SCH D	*SCH SE	F3468	F4835	
*SCH E	SCH W	F3903	F5695	

*Will prepare multiple schedules.

DEALER INQUIRIES INVITED For Faster Service, call 309-764-7245

- Send add'l. information
- \$89.95 TAX SURGEON II* - COPY PROTECTED
- Each of the 5 returns can be modified and updated as many times as necessary.
- \$995.00 TAX COMMISSIONER - NOT COPY PROTECTED
- Professional version for rapid computation and printing of thousands of returns. Laser printing available.
- *Add \$10.00 for UPS One Day Service

Name

Business

Address

City State Zip Phone No.

Card No. Expires

Signature



Tax Software Since 1981
"The right tax software decision"
TAXbyte, inc.
1801 6th Avenue Moline, IL 61265
(309) 764-7245

DATA INDEPENDENCE MUCH SMALLER



The Age of Data Independence™ dawned about two years ago when IOMEGA introduced a revolutionary mass storage device called The Bernoulli Box®. Featuring a unique technology that uses rugged,

removable 10-megabyte cartridges, it freed companies to work more productively and economically—and was soon recognized as the decade's biggest step forward in business data storage.

Today, IOMEGA has taken another giant step. With the addition of the compact 20-megabyte-per-cartridge Bernoulli Boxes, in single- and dual-drive versions, the Data Independence family gets simultaneously bigger and smaller. The new Bernoulli Boxes double on-line capacity to up to 40 megabytes and cut the space required to carry and store data cartridges. They also boast a footprint that is literally half that of the previous version, freeing just that much more valuable desk space.

But what makes the new Bernoulli Box so exciting are the same features that made it the new standard in data management to begin with.



EXPANDABILITY.

Free yourself from the limitations of system capacity. If you need more, you expand by buying slim, inexpensive cartridges, not bulky and costly hardware.



RELIABILITY.

Incredible resistance to shock and vibration combined with a rugged cartridge format frees you from concerns about equipment failure, head crash, or data loss.



TRANSPORTABILITY.

The Bernoulli Box cartridges are completely interchangeable. You're free to take the cartridge from one and use it in another with complete confidence. Take it across the hall or mail it across the continent.

THE BERNOULLI BOX

™: MORE GIANT STEPS. LARGER FOOTPRINTS.



PERFORMANCE.

The amazing speed of The Bernoulli Box—with access times and transfer rates that rival and often surpass the best hard disk drives—translates into the best freedom of all: the freedom of time. And now The Bernoulli Box offers users the option of booting from The Bernoulli Box cartridge with any of the IBM PC or compatible computers.



SECURITY.

Free your sensitive files, such as payroll and personnel, from unauthorized scrutiny and free yourself from unnecessary anxiety. Put them on a Bernoulli Box cartridge, and put the cartridge where *you know* it will be safe.



Check out the latest Bernoulli Box family members today. More giant steps towards the complete data independence of businesses using the IBM PC, XT, AT, most compatibles, and the Macintosh!™ Giant steps with very small footprints.

For the dealer nearest you, call 1-800-556-1234, ext. 215. In California, call 1-800-441-2345, ext. 215.



*The Bernoulli Box for Macintosh is available in a 5-megabyte single-drive version and a 20-megabyte dual-drive version for AppleTalk.™

The Bernoulli Box is a registered trademark of IOMEGA Corporation. Data Independence is a trademark of IOMEGA Corporation. Macintosh is a trademark licensed to Apple Computer, Inc. AppleTalk is a trademark of Apple Computer, Inc.

THE BERNOULLI BOX®

IOMEGA®

IOMEGA Corporation
1821 West 4000 South
Riv. Utah 84067

USER-TO-USER

```
100 ' FILMAKER.BAS
110 DEFINT A-Z:TIMES="0"
120 OPEN "seqfile" FOR OUTPUT AS #1
130 FOR A=0 TO 249
140 FOR B=1 TO 28
150 PRINT #1,A*28+B
160 NEXT B:NEXT A:CLOSE
170 PRINT "Seq file time ",TIMES
```

Figure 4: BASIC program to create 5,000-element integer sequential file as the product of two FOR...NEXT loops. This took 15 seconds on a supercharged PC AT running at 8 MHz and produced a 38K ASCII file, which became the input for the BSAVER.BAS program in Figure 5.

```
100 ' BSAVER.BAS -- by Steven Bair
110 DEFINT A-Z:TIMES="0"
120 DI=250:D2=20:ADDRESS=0
130 FILES="yourfile.txt"
140 DIM ARRAY(DI,D2)
150 OPEN "I",#1,"SEQFILE"
160 FOR N=1 TO DI
170 FOR J=1 TO D2
180 INPUT #1,ARRAY(N,J)
190 NEXT J
200 PRINT "LOADING time ",TIMES
210 TIMES="0"
220 SIZE=(DI+1)*(D2+1)
230 LENGTH=2*SIZE
240 ADDRESS=VARPTR(ARRAY(0,0))
250 BSAVE FILES,ADDRESS,LENGTH
260 PRINT "BSAVEing time ",TIMES
```

Figure 5: BASIC program to load 5,000-element integer sequential file and save it as a binary 250 × 20 array. On a supercharged PC AT running at 8 MHz, it took 13 seconds to load the sequential file, and just 1 second to save it as a 10K binary file.

```
100 ' BLOADER.BAS -- by Steven Bair
110 DEFINT A-Z:TIMES="0"
120 DI=250:D2=20:ADDRESS=0
130 FILES="yourfile.txt"
140 DIM ARRAY(DI,D2)
150 ADDRESS=VARPTR(ARRAY(0,0))
160 BLOAD FILES,ADDRESS
170 PRINT "BLOADER time ",TIMES
```

Figure 6: BASIC program to load binary 250 × 20 array. On a supercharged PC AT running at 8 MHz, it took just 1 second to load the array, compared to 13 seconds to load the same data as a sequential file.

Share Your Discoveries

Tell the world about your latest discovery through User-to-User, and we'll pay you \$50, plus an extra \$25 if you submit it on a disk. If you send a disk, please include a printout to ensure against damage in transit. Mail your contributions to User-to-User, *PC Magazine*, One Park Avenue, New York, NY 10016. ■

PC TOOLS

Put all the popular features of the NORTON UTILITIES* together with a powerful DOS interface. Then make them **resident** like SIDEKICK** and what do you have? PC TOOLS—the only product that lets you execute virtually any DOS command from within any other running program! Here's how you might use it:

- **UNDELETE** an accidentally erased file while using your word processor!
- **FORMAT** a data disk without leaving your spreadsheet!
- **COPY** files from one subdirectory to another within your communications program!
- **LOOK** at another file (and even edit it) from your graphics package!
- **SEARCH** for any file name or text within a file without leaving your data base manager!
- **PRINT** a file (as text or hex and ASCII) at any time!

PC TOOLS works on most IBM compatibles, requires 192K, 256K to use the memory resident feature.

PC TOOLS is unprotected, of course, to work great from your hard disk!

CENTRAL POINT
Software, Inc.
5700 SW Capital Way
Portland, OR 97219

503/244-5782
M-F 8-5:30, W. Coast Time
CHECK, C.O.D. INSTRUCTIONS
(Prepayment Required)

\$39.95

plus \$3.50 (US) overseas

*Norton Utilities is a registered trademark of Peter Norton
**Sidekick is a registered trademark of Borland International

CIRCLE 155 ON READER SERVICE CARD

WHO NEEDS A LAZY LASER PRINTER?

Not you. They're too expensive to have just sitting around. Expensive means hard to cost-justify. Or does it? It doesn't if you have more than one computer you can hook up to one of these swifties.

MAKE IT WORK WITH PrintDirector

What's PrintDirector?

It's a family of buffered, intelligent printer management products. It lets you hook up minis, PCs, modems, multiple printers, parallel and serial... you name it. Any mix of model and make. The buffer (60KB to 500KB) provides concurrent input and output. It handles different baud rates and protocols. No cable or switch flipping. No modifications to hardware or software. For more information on PrintDirector, the ultimate printer manager, call or write:

PrintDirector

Digital Products Inc. • The Simple Network Solution Company
600 Pleasant Street, Watertown MA 02172
(617) 924-1680 (Outside Mass., call 1-800-243-2333)
Prices start at \$645.

CIRCLE 244 ON READER SERVICE CARD

**AMT
286**

100% IBM PC AT compatible computer 6MHz or 8MHz (opt), 640KB memory, 8I/O expansion slots, 80287 option, Floppy and Hard disk controller, 1.2MB disk drive, 20MB Hard disk, KB, all for ***1999⁰⁰**
 Limited offer. (Suggested retail *1395⁰⁰)



AMERICAN MICRO TECHNOLOGY
(714) 972-2945
 TWX 5106003265

IBM PC, XT, AT & COMPATIBLES at wholesale prices

XT-PLUS an IBM PC XT Compatible Computer 640K on Mother Board, Keyboard, Eight Slots, Floppy Controller, P/P, S/P, Clock, Game Port, two Drives only ***799.**
 (Suggested Retail Price *1399.)

640K Ram	each	45
128K Ram	each	3.50
256K Ram	each	2.50
Toshiba Drive 360KB		79.00
1.2 MB Disk Drive for AT		129.00
20MB Hard Drive w/Controller and Cables		449.00
10MB Tape Back Up Drive for XT		299.00
10MB Tape B/U Drive for AT		375.00
135 watt Power Supply		79.00
195 watt Power Supply		125.00
FDC with P/P, S/P, Clock & Game Port		98.00
AT Mother Board		799.00
XT Mother Board		125.00
Floppy/HD Controller for AT		219.00

AMT
(714) 972-2945
 TWX 5106003265

Ask for our
 Free Catalog

UNBELIEVABLE PRICE! WHOLESALE PRICE TO THE PUBLIC!

100% IBM XT[®] COMPATIBLE

* 1 YEAR WARRANTY ON ALL SYSTEMS *



COMPLETE MONOCHROME SYSTEM, \$965
 2 DRIVES DS/DD, 256 K, MONOCHROME
 MONITOR, MONOGRAPHIC CARD (HERCULES COMPATIBLE)

FOR OTHER CONFIGURATIONS CALL FOR
BEST PRICES YOU WON'T BELIEVE!

SPECIAL OF THE MONTH!

10 MB HARDISK (SEAGATE W/CONTROLLER)	\$495
20 MB HARDISK (SEAGATE W/CONTROLLER)	\$595
MULTIFUNCTION CARD	\$119

CIRCLE 308 ON READER SERVICE CARD
ATLANTIC COMPUTER SYSTEM (213) 720-1461
 2260 S. ATLANTIC BLVD. #F MONTEREY PARK, CA 91754

The REAL-TIME CLOCK-CALENDAR for IBM PCs and COMPATIBLES



dClock is compatible with all IBM microcomputers

dClock is a user-installable, real-time clock-calendar for IBM[®] Personal Computers and selected compatibles. *dClock* automatically enters the date and time into the user's computer system each time the computer boots. Through use of an internal battery, *dClock* maintains precise time and date function when the system is shut down. *dClock* fits directly onto the system's motherboard in the 3088 socket. It does not occupy an expansion slot, nor does it take space from multi-function cards or memory.

dClock allows a full complement of expansion cards to be used without compromising dependable time-date system functions. *dClock* is easily installed and provides PC users with a convenient way to have accurate date and time functions without paying for expensive or unnecessary expansion cards. *dClock* comes with installation software, a Limited Warranty and complete documentation (including how to upgrade your XT or COMPAT[®] Portable to 640K easily and without using any expansion slots).

Available from **MICROSYN** for just **\$59.95**

(Please add \$2 for shipping and handling.)

MICROSYN is a computer peripherals product manufacturer specializing in microcomputer board-level accessories and enhancements.

MICROSYN

Computer Products Department • P.O. Box 118302 • Carrollton, Texas 75011 • 214-492-5265

IBM and MICROSYN are Registered Trademarks of IBM CORP. IN THE U.S. and a Registered Trademark of International Business Machines Corp. COMPAT is a Registered Trademark of COMPAQ Computer Corp.

CIRCLE 390 ON READER SERVICE CARD

PC MAGAZINE • JANUARY 14, 1986



PC Tutor

PC Tutor answers queries on everything from operating systems to applications to hardware.

Security Concerns

At my place of work we use an IBM XT to maintain a database containing confidential information. We've had several experiences with unauthorized people using the system, so I've been trying to install some kind of password security program. I've solved most of the problems but find myself stuck on two: (1) How can I prevent someone from Ctrl-Breaking out of an AUTOEXEC.BAT file at the power-up? Do I need a device driver for this? (2) How can I prevent someone from booting up the system with his own floppy and then gaining access to the hard disk? I tried switching the cable on the diskette drive to disable drive A:, but this results in an error at boot time.

Dave Marshall
Alberta, Canada

One of the consequences of the PC's open architecture is that password security is very difficult to implement. You should probably consider other alternatives for protecting your data. While I don't have a completely tamper-proof and hassle-free solution for your problem, it will be useful to discuss a few ideas, including some very low-tech ones and a few that are somewhat expensive.

Many corporate PC users live by a simple rule: If the file contains confidential information, it must be stored on a diskette and kept in a locked desk. (Typically some paranoia accompanies this rule, such as requiring users to turn off the PC's after using a confidential file so nobody could DE-BUG the data out of memory. Outside the CIA, that seems a bit extreme.)

If your database is much too big and complex for diskettes, another solution is Iomega's Bernoulli Box. The standard configuration comes with two 10-megabyte drives with removable cartridges. Bernoulli Box disk access is faster than XT

hard disk access, and the cartridges are more reliable, since they cannot crash. Cartridges are removable, very easy to back up, and they can be kept in a safe place when not in use. People who use the Bernoulli Box (including me) really love them. The list price is about \$3,500.

If you have multiple users of this system, however, people may find it inconvenient to fetch a diskette or Bernoulli Box cartridge whenever they need to use the database. You could, therefore, replace the XT hard disk with another that is not quite so IBM compatible. Such third-party hard disks generally require a driver program in a CONFIG.SYS file during boot time. Thus, authorized users could be given a copy of the properly configured boot diskette. If the machine is turned off after each use, the hard disk could not be accessed without the right driver program. (The Bernoulli Box without the boot option also needs a driver file, but if you left the cartridge itself in the machine, someone could walk away with it.)

Another possibility is to use an encryption and decryption program. After using a confidential file, you'd run the encryption program with a password, which scrambles up the file. When you wanted to use it again, you'd run the decryption program with the same password to unscramble it. Low-cost encryption programs are readily available. One such program is provided with Borland's SuperKey, for instance, and a free one is presented in Steve Holzner's Programming column in PC Magazine, Volume 4 Number 18.

Such encryption schemes are very difficult to break without knowing the password, even if you should gain access to the decryption program. Moreover, if someone maliciously tries to scramble up the encrypted program, it should be obvious when it's decrypted. To protect against such contingencies, you should be keeping

★ ★ ★ ★ ★
MAIL ORDER PC Add-Ons
Call Toll Free
800-628-2828 Ext. 526
(for Orders Only)

HARD DISK

10MB MicroScience	
With Controller.....	\$479
20MB MicroScience	
With Controller.....	\$558
20MB Seagate	
With Controller.....	\$515
20MB Tandon	
With Controller.....	\$520
External 10/20MB.....	\$605/\$710
33MB Drive	
With Controller.....	\$1029

BACK-UP SUB SYSTEMS

10MB Tape Back-up	
Drive.....	\$410
20MB Cassette Back-up	
With Controller.....	\$620
60MB Streaming Tape	
Back-Up.....	\$799

Hayes® Compatible Modems

300/1200 baud	
Internal.....	\$179
Half-size 300/1200 baud	
Internal.....	\$189

Floppy Drive

360K for PC, XT.....	\$85
360K for AT.....	\$100

Multifunction Card

With OK RAM.....	\$119
With 384K RAM.....	\$169

Serial Port, Parallel Port,
Game Port, Clock/Calendar

Everex Graphics Edge...\$275

Everex The Edge.....\$265

Compare our Low Price!!!

You get 30 days money-back
guarantee and full manufacturer's
warranty on any of our products.

Call us Right Now....


ELTECH
RESEARCH (USA), Inc.

318 S. Abel St., Milpitas, CA 95035

408/842-1280

(for Technical Information)

★ ★ ★ ★ ★



HOW TO COPE WITH THE INFORMATION EXPLOSION

If your job requires locating product reviews, financial data, company reports and other important information about the computer industry coming from hundreds of periodicals... you can now relax.

We've abstracted thousands of articles, organized them, indexed them and put them in one reference guide that will lead you to the right information *fast*.

We're **Data Sources COMPUTER INDUSTRY DIGEST**... the first and only definitive source of virtually every hardware and software product review printed in the English language.

Abstracted, and indexed by manufacturer's name. Plus abstracts of articles reporting on the financial transactions of companies in the computer industry, including acquisitions, mergers, divestitures, earnings and financing.

It's published by **Data Sources**, the most comprehensive directory of computer products and companies.

It can save you hours of time, leg-work and frustration.

And best of all, it comes to you twice a year for the annual subscription price of only \$150—a savings of nearly \$50.00 off the regular price.

Data Sources COMPUTER INDUSTRY DIGEST. To subscribe, write to us today. And save yourself hours of time and trouble tomorrow.

TDS7

DATA SOURCES
COMPUTER INDUSTRY
DIGEST

ONE PARK AVENUE, 4TH FLOOR, NEW YORK, N.Y. 10016
(212) 503-5395



PC TUTOR

diskette backups anyway.

Steve Hatzner's programs prompt for the password (sa they could be put in a batch file), but they work only on files less than 62K. Moreover, if you work with several files, it might be tedious to enter a password for each one.

Preventing someone from using your PC entirely is a little more difficult. One solution is a lock switch on the machine, something like the keyboard lock on the PC AT. (Has anyone tried to hot-wire an AT lock yet?) I've seen some ads for locks that attach to the on/off switch on the PC and PC-XT. Granted, a lock is a nuisance, but it's not too bad if you give a copy of the key to all authorized users. (In New York City, office buildings often keep their bathrooms locked, and all employees have a copy of the key. New Yorkers would just add the PC key to the rest they must carry and take it in stride.) Cost: about \$35.

Honesty compels me to note, however, that people who are adept at breaking computer security systems are often quite competent locksmiths as well.

As you've found out, putting a password program in an AUTOEXEC.BAT program on the PC-XT does not work at all, since the user can break out of the batch file before the program is even executed. You can, as you suggest, put the password program in a dummy device driver. Device drivers are loaded early in the boot process, and it would not be possible to break out of it.

You've still got a problem here, however, because anyone can come along with a bootable diskette and boot the machine from drive A:. I do not recommend attempting to disable drive A: to prevent this.

You can, however, install a password program that cannot be circumvented by a drive A: boot. This program has to be executed before the PC even attempts to boot. Here's how it works:

As you may know, when the PC is first turned on, it executes a "power-on self test" (POST) program coded in the PC's ROM BIOS. This program initializes the system, checks memory, and ultimately boots the operating system from a diskette or hard disk. Before the boot, however, the POST program checks memory locations between addresses C8000h and F4000h

for the presence of additional read-only memory (ROM) programs. Generally, these programs are used to perform some extra system initialization before the PC is booted. In fact, the extra BIOS for the XT hard disk is at address C8000h. You would have to program a small password routine somewhere in that memory space where it wouldn't conflict with anything else. Moreover, the program must stay in memory when the PC is turned off.

Getting a password encoded in ROM is a bit extreme. An easier approach is to code it into RAM on a CMOS RAM memory board with battery backup.

Getting the password program encoded in ROM is a bit extreme. An easier approach is to code it into random access memory on a CMOS RAM memory board with battery backup. (Tecmar, for instance, sells a 32K CMOS RAM board through its Scientific Solutions subsidiary for about \$450.) CMOS RAM uses very little power—almost none at all while inactive—so a rechargeable battery backup should last for many months.

The board's memory address would be set up to begin at D0000h, D8000h, E0000h, or E8000h. The program must use a special format, which is explained in the ROM BIOS section of the PC or XT Technical Reference manuals, under the heading "Adapter Cards with System-Accessible ROM Modules." The code must start off with a 55h and AAh, to tell the BIOS that it is executable. The third byte is the number of 512-byte blocks in the program—probably 1 for a simple password routine. The program itself begins at the fourth byte, and it must return to the BIOS with a far return. You should write the program in assembly language, and you may not use any DOS calls (Interrupts 20h and up) because DOS will not be loaded when the program runs. You may, however, use all the BIOS resources for the keyboard and display.

The ROM BIOS does a check-sum of

DO YOU KNOW THE 10,000 PRODUCTS AVAILABLE FOR YOUR IBM PC?



Whether you're adding-on a new printer, or in the market for new software, **PC BUYERS GUIDE** is your sourcebook to virtually every product available for IBM PCs and compatibles.

Updated and published every 90 days, **PC BUYERS GUIDE** lists over 10,000 products to help you purchase the equipment that meets your needs.

Order your copy of **PC BUYERS GUIDE** today!

PC BUYERS GUIDE

Ziff-Davis Publishing Co.
One Park Avenue — 4th Floor
New York, NY 10016; K. Armstrong

Please send _____ copies of the latest edition of **PC BUYERS GUIDE**. Enclosed is my check or money order for \$9.45* (\$7.95 plus \$1.50 for postage and handling) for each copy. (Price outside U.S. \$11.00.)

Mr./Mrs./Ms. _____
(please print)

Address _____

City _____ AN32

State/Zip _____

*Residents of CA, CO, CT, DE, FL, IL, MA, MI, MO, NJ, NY State, and VT add applicable sales tax.

The print program HP uses to show off the LaserJet.™

Works with Wordstar,™ and NOW with any ASCII file.

Now use all the powerful features of LaserJet and WordStar together. Polaris PrintMerge™ supports every function of WordStar, with the same dot and control characters you're using already. Used with PrintMerge's own dot and control commands, you get professional quality documents with a few keystrokes. See why Hewlett-Packard™ and John Dvorak (InfoWorld, April, 1985) recommend PrintMerge.

- Mix text and graphics
- Supports all LaserJet PLUS™ features
- Supports all font cartridges
- Print spreadsheets and tables with proportional fonts
- Draw vertical and horizontal lines and boxes
- Print text with forms
- Micro-spacing right-hand justification with any combination of fonts

Print over 100 symbols with the Polaris Symbol Sheet™ (sold separately, \$49.95)



\$99 copy-protected (IBM only)
\$124 non copy-protected (IBM and HP)
\$6 shipping and handling, plus tax in CA

Order now without risk. Money-back guarantee.

Runs on IBM-PC 100% compatibles with 196K RAM under PC-DOS, or the HP 150 with 384K RAM.



310 Via Vera Cruz, Suite 205, San Marcos, CA 92069
(619) 471-0922

Registered trademarks: LaserJet and LaserJet PLUS, Hewlett-Packard Corp. IBM PC, International Business Machines, WordStar and MultiMate are rights of International Business Machines Corp. Lotus 1-2-3 Lotus Development Corp. Polaris PrintMerge and Polaris Symbol Sheet Polaris Software

Custom LaserJet™ Labels. Effortlessly.

Envelopes, too.

Use Polaris Software's Labelmaker™ with any word processing program or text editor to create labels or envelopes of any size, with any combination of fonts. Labelmaker can take label text from any program, or merge data from any database. You can even enter label text interactively from the keyboard. It's also great for fast, high-quality labels and envelopes with:

- Bar code
- Serial numbers (incremented or decremented with any quantity of each serial number)
- Lines and boxes
- Graphic symbols
- UPS COD labels

Mr. Jamie Owen Leach
The Journal of Social Psychology
Polaris Software
310 Via Vera Cruz, Suite 205
San Marcos, CA 92069



Order your Labelmaker for only \$99 (copy-protected, IBM only) or \$124 (non copy-protected, IBM and HP), plus \$6 shipping and handling. Money-back guarantee. Call now.



310 Via Vera Cruz, Suite 205, San Marcos, CA 92069
(619) 471-0922

Registered trademarks: LaserJet, Hewlett-Packard Corp. Labelmaker Polaris Software

Runs on IBM-PC 100% compatibles with 196K RAM under PC-DOS, or the HP 150 with 384K RAM.

PC TUTOR

the bytes of the program and gives you a terse "ROM" message if they don't add up to zero ignoring overflow above 256. So, you're going to have to add up all the bytes in your program, take the negative, and put that byte somewhere in the file.

Figure 1 shows an assembly language program that could get you started. (I must emphasize that I have not tested this program with a CMOS memory board, but it follows all the rules and should work.) The use of the word password for a password is obviously a very poor choice and is used here only for illustration. Note that there is no prompt for the password. Nor are the characters echoed to the display. To someone who doesn't know that you've installed this, it will appear as if the machine is broken and will not boot. Note also the nasty CLI and HLT code if a wrong letter is typed. This will disable interrupts and halt the microprocessor, so even a "three-key" restart won't work. Any tamperer would have to turn the machine off and back on to try again. You could omit the CLI to allow use of Ctrl-Alt-Del if a mis-match occurs.

You can get more elaborate and allow

```

; PASSWORD.ASH for CMOS RAM
;
; CSEG Segment
; Assume CS:CSEG
Marker db 55h, 0AAh, 1

Entry Proc Far
Mov BX, Offset Pword - 1
Mov CX, 8

Loop: Sub AH, AH
Int 16h
Inc BX
Cmp AL, CS:[BX]
Jnz NoGood
Loop Loop

NoGood: Cli
Hlt
Entry EndP

Pword db 'password'
Check db ?
db (512-($-Marker)) dup (0)

CSEG Ends
End
    
```

Figure 1. A simple password program that could reside in a CMOS RAM to prevent the PC from booting unless the correct 8-letter string was typed.

ONE GOOD PC INVESTMENT DESERVES ANOTHER!

PC MAGAZINE!



TESTED APPLICATIONS!

YES! I'd like to subscribe to PC Magazine—and save up to 50%! Please enter my subscription as indicated below:

- ☐ One year (22 issues) for only \$21.97. I save 37%!
☐ Two years for only \$34.97. A 50% savings!
☐ Payment enclosed ☐ Bill me later

Mr./Mrs./Ms. _____ please print full name _____ PC 45C58
 Company _____ Title _____
 Address _____
 City _____ State _____ Zip _____

Add \$15 per year outside USA. Savings based on regular one-year (22 issues) subscription price of \$34.97. Please allow up to 60 days for delivery of first issue.

Make sure you get the most out of your PC with PC Magazine!

PC brings you hands-on, torture-tested hardware and software reviews and evaluations, new applications to maximize the overall performance of your PC, and powerful user techniques that increase the speed and flexibility of your system!

PC Magazine provides you with the news, information, and ideas that help you make the most out of your investment—22 times a year!

Subscribe today and save up to 50% off the regular subscription price!

To subscribe,
**CALL TOLL-FREE,
 1-800-852-5200**

or use one of
 the attached cards.



UNBIASED PRODUCT REVIEWS!

YES! I'd like to subscribe to PC Magazine—and save up to 50%! Please enter my subscription as indicated below:

- ☐ One year (22 issues) for only \$21.97. I save 37%!
☐ Two years for only \$34.97. A 50% savings!
☐ Payment enclosed ☐ Bill me later

Mr./Mrs./Ms. _____ please print full name _____ PC 45C58
 Company _____ Title _____
 Address _____
 City _____ State _____ Zip _____

Add \$15 per year outside USA. Savings based on regular one-year (22 issues) subscription price of \$34.97. Please allow up to 60 days for delivery of first issue.



POWER USER TIPS AND TECHNIQUES

YES! I'd like to subscribe to PC Magazine—and save up to 50%! Please enter my subscription as indicated below:

- ☐ One year (22 issues) for only \$21.97. I save 37%!
☐ Two years for only \$34.97. A 50% savings!
☐ Payment enclosed ☐ Bill me later

Mr./Mrs./Ms. _____ please print full name _____ PC 45C58
 Company _____ Title _____
 Address _____
 City _____ State _____ Zip _____

Add \$15 per year outside USA. Savings based on regular one-year (22 issues) subscription price of \$34.97. Please allow up to 60 days for delivery of first issue.

**BUSINESS REPLY MAIL**

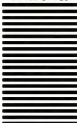
FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE

P.O. Box 2443
Boulder, Colorado 80321NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE

P.O. Box 2443
Boulder, Colorado 80321NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 66 BOULDER, COLORADO

POSTAGE WILL BE PAID BY ADDRESSEE

P.O. Box 2443
Boulder, Colorado 80321NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES**GET A GREATER
RETURN FROM
YOUR PC!***Because PC Magazine brings
you all of this 22 times a year!*

- Breakthrough product announcements!
- In-depth reviews and product evaluations!
- Professional, hands-on applications!
- Time- and money-saving ways to use your PC!
- User-to-user exchange of ideas and shortcut routines!
- Up-to-the-minute news on the IBM industry!

Subscribe today**For fast service
CALL TOLL FREE
1-800-852-5200**

Speed things up

Take the Governor Off
Your Productivity and Profits
With IBM™ Compatibles from GMS.



GMS PC/88 • 8088 (4.77MHz) Processor • Enhanced System Board with 256 to 640K8 • 8 Slots Available • IBM BIOS Guarantee

GMS PC/88 2 • 8088-2 (4.77 and 7.33MHz) Processor • 54% Faster than IBM/XT • BIOS Compatibility Guarantee with IBM/XT • 10 to 120MB Disk Options • Integrated Tape Back-up • Enhanced System Board with 256 to 640K8 • External System Reset Button • 8 Slots Available • TRW Nationwide Service Options

GMS PC/286 • 80286 (8MHz) Processor • 9 Times Faster than IBM/XT • 30% Faster than IBM/AT • 10 to 120MB Disk Options • Integrated Tape Back-up • BIOS Compatibility Guarantee with IBM/XT • Enhanced System Board with 256 to 640K8 • External System Reset Button • 8 Slots Available • TRW Nationwide Service Options

GMS APC/286 • 80286 (8MHz) Processor • 30% Faster than IBM/AT • BIOS Compatibility Guarantee with IBM/AT • 10 to 120MB Disk Options • Integrated Tape Back-up • 512K8 Expands to 1000K8 • Enhanced System Board with 12 Expansion Slots • External System Reset Button • TRW Nationwide Service Options



5500 N. Federal Highway, Boca Raton, FL 33431
Telex: 910 380 0112

1-800-443-0500

We're Products. We're Service. We're Support.

SHELF CONSCIOUS?

Now you can organize your copies of
PC MAGAZINE

Now your magazines can be a handsome addition to your decor, well organized, and easy to find, thanks to these durable library-quality cases or binders. They're made of luxury-look leatherette over high-quality binder board. And both styles are custom-designed for this or any other magazine you save, with size, color and imprint selected by the publisher. FREE transfer foil included for marking dates and volumes.



Magazine binders

holds your issues on individual snap-in rods, combining them into one volume. \$7.95 each; 3 for \$22.50; 6 for \$42.95. Mixed titles OK for quantity prices.



Open-back cases

store your issues for individual reference. \$6.95 each; 3 for \$19.75; 6 for \$37.50. Mixed titles OK for quantity prices.



OR CALL
1-212-503-5319

PC Magazine

P.O. Box 5120, Philadelphia, PA 19141

Please send ☐ Cases ☐ Binders

Title ☐ PC Magazine ☐ Other QUANTITY

Other ☐ PAYMENT ENCLOSED \$_____ Add

\$1.00 per order for postage and handling. Outside USA add \$2.50 per unit ordered; send US funds only.

☐ CHARGE (Minimum \$30)
☐ American Express ☐ MasterCard
☐ Visa

Card No. _____ Exp. Date _____

Signature _____

Print Name _____

Address _____

City _____

State/Zip _____

*Residents of PA add 6% sales tax

Reviews in Brief

Restful Bliss for the Eyes: The Roland MB-142 Monitor

BY GLENN HART

Two characteristics set this high-quality TTL monochrome monitor apart from such competing displays as the Princeton Graphics MAX-12, the Amdek 310, and IBM's own. First, the phosphor is not the common green or even the increasingly popular amber, but black and white. Though this seems like a throwback to days of old, it really isn't. The "white" is more an eggshell off-white shade that is much less glary than the old black-and-white monitors. A front-panel switch inverts the display from white on black to black on white. The inverted mode looks like normal typing on paper, a screen style much admired by some word processing users. RolandCorp also pitches the MB-142 to users with monochrome graphics cards like the Hercules or compatibles, claiming that images from AutoCAD and the like are easier to view and manipulate in the black-on-white mode.

The second distinction is that the MB-142 has a 14-inch screen rather than the 12-inch screens usually used. The letters are noticeably larger and easier to read, and graphics images are proportionally bigger as well. The monitor is enclosed in a stylish housing quite a bit larger than an IBM monochrome monitor, but there is plenty of room on a PC or AT to hold this display.

RolandCorp claims that the off-white phosphor is more restful than either green or amber. In the absence of quantified tests, I'll just say that the MB-142 is definitely easy on the eyes. The larger text and graphics is immediately noticeable and is a clear advantage. The

phosphor has low persistence, which is desirable. Strangely, any observable persistence appears to be multicolored, a characteristic attributable to human vision rather than to any flaw in the monitor itself.

One major problem is the size and horizontal positioning of the image. While there are vertical and horizontal position adjustments on the rear on the monitor, the correct settings are not consistent. For example, when the screen image is set correctly for AutoCAD, it's too far to the left for Microsoft Word. Using a variety of programs required constant fiddling with the horizontal position control. RolandCorp says that the problem occurs only with Hercules monochrome

graphics boards or compatibles (like my Everex Graphics Edge card). A special patching program that RolandCorp claims will fix the problem did help a bit but did not solve the difficulty completely. Users without Hercules cards won't even know there's a problem, and even Hercules owners may not have any difficulty with specific programs.

A few other annoyances cropped up as well. In the black-on-white mode, the distinction between high and normal intensity is impossible to see, no matter how the contrast control is set (the distinction is as clear as with any other monitor in the white-on-black mode). Some flicker can be observed in the black-on-white mode, but this



Roland's MB-142 Monitor

is primarily a result of the design contingencies of IBM-compatible monitors and not totally the fault of this monitor.

Overall, the MB-142 monitor is an excellent device. To my eye, text is optimally sharp. The characters look almost fully formed, with just enough blend from dot to dot. Construction quality is also very good, clearly better than even the IBM monitor.

(continues)

The Shocking Truth: ACL's Electrostatic Locator

BY GLENN HART

Comedian Steven Wright tells audiences he doesn't pay his electricity bills because he's never seen electricity. As with most humor, there is just enough truth in this apparently ridiculous statement to strike a familiar, and thus funny, chord. PC users presumably accept the fact that the electricity supplied by a wall socket is real enough. However, my experience as a consultant has shown that there's a related—and dangerous—phenomenon that a surprising number of computer users either won't or simply can't accept: static electricity.

For some reason, the person who jumps when touching a doorknob after walking across a



The ACL Electrostatic Locator

rug just doesn't believe that the same electrical phenomenon can adversely affect delicate microchips. Even highly sophisticated PC users won't believe that the problems they experience with their disk drives, keyboards, and other parts of their computers can be caused by this invisible but destructive force. Most warnings in computer supply catalogs are regarded as merely sales hype, and the salesman's, serviceman's, or consultant's explanations are treated as simple excuses for defective hardware. The truth is, static can damage components at voltages much lower than those needed for a doorknob to give you a jolt. A PC user who refuses to take precautions is asking for trouble.

An inexpensive new device from ACL Inc. may help both sides. Called the ACL Electrostatic Locator, Model 300, this

(continues)

ROLAND MB-142 MONITOR

(continued from previous page)

I tended to use the MB-142 in black-on-white mode almost exclusively. The MB-142 was especially delightful with AutoCAD. Detailed drafting images were easier to study—and easier on the eyes—with the Roland MB-142 than with either my IBM green monochrome or PGS amber MAX-12 monitors. Word processing was also enhanced by the legibility of the large characters produced by the MB-142.

The monitor is significantly more costly than most of its competitors, but I think it's

worth the difference in many applications. I wish the image size problem could be fixed entirely and something should be done about the high-intensity issue, but the MB-142 has earned a place in one of my IBM systems. It merits serious consideration for your word processing or CAD system, too. ■

Roland MB-142
Monochrome Monitor
Roland Corp. U.S.
7200 Dominion Circle
Los Angeles, CA 90040
(213) 685-5141
List Price: \$375

Circle 690 on Reader Service Card

ELECTROSTATIC LOCATOR

(continued from previous page)

simple-to-use meter provides fast and accurate measurement of static charges. Two switches control the meter's operation. The first, "LO-OFF-HI," selects the sensitivity range and applies power; the second checks the internal 9-volt battery, enables normal reading, and zeros the meter prior to a measurement.

The ACL 300's actual sensitivity depends on the distance from the sensing head to the test object, as one would expect given the laws of physics. In LOW position, the meter is sensitive from 0 to 500 volts when the test subject is half an inch away, and 0 to 3,000 volts for a subject 4 inches away. In the HIGH position, the sensitivity is ten times less, 0 to 5,000 volts and 0 to 30,000 volts. These controls give quite a range of measurement, but it is difficult to posi-

tion the test object exactly the correct distance from the meter. Therefore, the readings should be considered relative instead of absolute.

This isn't much of an issue, though, for two reasons. First, the readings I took seemed very consistent, so perhaps the distance isn't quite as critical as it would seem. Second, and more important, the average user is more concerned about the general magnitude of a problem than about making a laboratory measurement of absolute voltage. The meter itself is amply large, but the scales are not particularly well marked for laboratory use.

The ACL 300 worked just fine on balloons and wool sweaters, but less dramatically on computers. The effect was dampened somewhat because the testing environment was reasonably humid, whereas the dryer winter season would exaggerate static problems. Nevertheless, I did determine that my rather elderly carpet-style static mat wasn't doing an effective job anymore.

ACL sells a complete line of antistatic treatments, including liquids that can be sprayed on carpets and chairs, towelfettes

soaked with such liquid for use on CRT screens and the like, and more. The Electrostatic Locator reveals the dramatic reduction in static charges when these antistatic treatments are used. It is a specialized gadget that performs its limited function beautifully. ACL already has an industrial market for the Model 300 meter, but it hopes to sell the device to microcomputer users who can then determine when and where to apply antistatic treatments to their computing environments. I'm not sure many individual users will want to spend \$300 for the meter, but corporate buyers, consultants, and dealers can avoid multitudes of problems with it. Antistatic devices pay back their relatively modest cost quickly by ensuring more trouble-free computing. ■

The ACL Electrostatic Locator, Model 300
ACL Inc.
1960 E. Devon Ave.
Elk Grove Village, IL 60007
(312) 981-9212
List Price: \$299.95; case, \$19.95

Circle 689 on Reader Service Card

Ready-to-Go Label Printing: LABMAKR.PC

BY JAMES LANGDELL

Have you ever tried to have your computer print a set of peel-off labels, only to wind up spending half a day convincing your word processor to aim its letters at the right spots on those gummy little pieces of paper? LABMAKR.PC might have saved you some of that hassle.

The program has 26 ready-to-go formats for labels that are suitable for envelopes, file folders, diskettes, videotapes, and cassette tapes. It's ready to accommodate four common sizes of labels: $1\frac{1}{2} \times 3\frac{1}{2}$ inches (16 different text formats), $7\frac{1}{2} \times 2\frac{1}{2}$ inches (6 formats), $7\frac{1}{2} \times 3\frac{1}{2}$ inches (one format), and $1\frac{1}{2} \times 3\frac{1}{2}$ inches (an audio cassette label with a precut hole). These

labels are available in perforated rolls that can be fed through your computer's printer.

The program prints characters in five different sizes, from $1\frac{1}{2}$ -inch-high headlines to tiny letters that usually are reserved for superscripts. Some labels use characters of one size throughout, while others with busier layouts mix several sizes, even on the same line, which would be hard or impossible to produce on a word processor. On a $3\frac{1}{2}$ -inch-wide label, lines of text can contain up to 14 headline characters, 25 pica text characters, or 50 microelite and superscript characters.

Creating a new label is a very straightforward process. You select one of the 26 formats by pressing a letter key. The

screen will display a template with each available character space indicated in a fair representation of the finished label.

In the printing mode you can create a batch of labels at once by giving the beginning and ending numbers of a series or by asking for multiple copies of a label. Text and format information for each label you design is stored in an individual file (EN051.E is a typical file name). This arrangement puts a tight ceiling on the number of labels you can store on each diskette: When you hit DOS's limit of 112 files per disk, probably only a third of the disk's raw capacity will have been used. You can store additional files on any number of diskettes or in a hard disk's subdirectory.

When setting up the program, you may have to get involved with such esoterica as the printer-ready flag, port numbers, and the interlabel line-feed increment. But if the

program has the wrong default values for these items for your printer, the screen and the manual work together well to help you find the right magic numbers and put them in the right places. The manual also includes several useful tips about using printers, a welcome change from most software manuals that ignore such "hardware problems." ■

LABMAKR.PC
ETS Center
35026-A S. Turtle
P.O. Box 651
Willoughby, OH 44094
(216) 945-8479
List Price: copy-protected version, \$49 (printing stock sampler kit, \$5); non-copy-protected version, \$64
Requires: 128K RAM, one disk drive, DOS 1.1 or later, dot matrix printer.

Circle 688 on Reader Service Card

**It's easy to make a copy.
It's quick.
It's illegal.
It's wrong.**

It's hard to believe.

People who wouldn't think of shoplifting a software product on their lunch hour don't think twice about going back to the office and making several illegal copies of the same software.

Making unauthorized copies of software is a violation of Copyright Law. Yet, the problem has reached epidemic proportions because many people are unaware, or simply choose to ignore the law. The software industry is urging decision-makers and software users to take steps to stop software piracy in their organizations. In the meantime, the industry has been forced to prosecute willful copyright violators.

There are legal, moral and economic imperatives forbidding theft of copyrighted software.

There is a free pamphlet on the subject. Call or write for a copy. A copy. A copy. A copy for everyone you know. Please ask for Priscilla.



ADAPSO
1300 North Seventeenth Street
Arlington, Virginia 22209
(703) 522-5055





IBM COMPATIBILITY

...at a not so IBM price

TECH TURBO PC/AT \$2399

PRICE INCLUDES:

- 6 TO 8 MHZ 80286 CPU
- 512K
- ONE, 1.2 MB FLOPPY DRIVE
- 8 EXPANSION SLOTS
- 195 WATT POWER SUPPLY
- COMPLETE MS DOS, PC DOS, XENIX COMPATIBILITY
- RUNS LOTUS 123, DBASE III FRAMEWORK AND ALL OTHER POPULAR AT SOFTWARE
- ONE YEAR WARRANTY!!

OPTIONS:

- TECH TURBO PC/AT WITH 20MB HARD DISK **\$2825**
- TECH TURBO PC/AT WITH 20MB HARD DISK, MONOCHROME MONITOR, HERCULES® COMPATIBLE MONO/GRAPHICS CARD **\$2999**

ALSO AVAILABLE WITH TAPE BACKUPS, MODEMS, LARGER HARD DISKS, AND NETWORKING SYSTEMS.

TECH PC/AT \$1999

PRICE INCLUDES:

- 6MHZ 80286 CPU
- 512K
- ONE, 1.2 MB FLOPPY DRIVE
- 8 EXPANSION SLOTS
- 195 WATT POWER SUPPLY
- COMPLETE MS DOS, PC DOS, XENIX COMPATIBILITY
- RUNS LOTUS 123, DBASE III FRAMEWORK AND ALL OTHER POPULAR AT SOFTWARE
- ONE YEAR WARRANTY!!

OPTIONS:

- TECH PC/AT WITH 20 MB HARD DISK **\$2499**
- TECH PC/AT WITH 20MB HARD DISK, MONOCHROME MONITOR, HERCULES® COMPATIBLE MONO/GRAPHICS CARD **\$2699**

ALSO AVAILABLE WITH TAPE BACKUPS, MODEMS, LARGER HARD DISKS, AND NETWORKING SYSTEMS.

TECH TURBO PC/XT \$1099

PRICE INCLUDES:

- 4 TO 7 MHZ SOFTWARE SWITCHABLE CPU
- 640K
- TWO 360K DS/DD FLOPPY DISK DRIVES
- 8 EXPANSION SLOTS
- 135 WATT POWER SUPPLY
- ONE YEAR WARRANTY!!

OPTIONS:

- TECH TURBO PC/XT WITH 20MB HARD DISK **\$1699**
- TECH TURBO PC/XT WITH 20MB HARD DISK, MONOCHROME MONITOR AND HERCULES COMPATIBLE MONO/GRAPHICS CARD **\$1950**

ALSO AVAILABLE WITH TAPE BACKUPS, MODEMS, LARGER HARD DISKS, AND NETWORKING SYSTEMS.

TECH PC/XT \$799

PRICE INCLUDES:

- 4.77 MHZ CPU
- 256K
- TWO, 360K DS/DD FLOPPY DRIVES
- 8 EXPANSION SLOTS
- 135 WATT POWER SUPPLY
- ONE YEAR WARRANTY!!

OPTIONS:

- TECH PC/XT WITH 20MB HARD DISK **\$1449**
- TECH PC/XT WITH 20MB HARD DISK, MONOCHROME MONITOR, HERCULES COMPATIBLE MONO/GRAPHICS CARD **\$1649**

ALSO AVAILABLE WITH TAPE BACKUPS, MODEMS, LARGER HARD DISKS, AND NETWORKING SYSTEMS.

HI-TEK PGS AVT TAXAN IBM AMDEK HERCULES GENOA PARADISE TEAC TOSHIBA HARDWARE/SOFTWARE NETWORKING HAYS AST JRAM HI-TEK PGS AVT TAXAN AMDEK HERCULES GENOA PARADISE TEAC TOSHIBA
PLEASE ALLOW ONE WEEK FOR SHIPPING VISA, MASTERCARD TELEX: 272006 Answer Back-TECH FAX: 714/556-8325

TECH PC

CIRCLE 328 ON READER SERVICE CARD
TECH PERSONAL COMPUTERS
 2131 South Hathaway, Santa Ana, California 92705

714/754-1170

©1985 TECH PC IBM, IBM PC, XT and AT are registered trademarks of International Business Machines Corp. Hercules is a registered trademark of Hercules Computer Technology.

For lack of space, a few products I reviewed last year were cut from their issues and the information never made it to the printed page. However, I feel strongly about these four programs—each is good enough to deserve its day in court.

Those who would rather invest in land than in paper will be interested in *The Professional Real Estate Analyst*, a template for 1-2-3 loaded with investment analysis tools for residential and commercial real estate management. The program produces five reports: monthly income and annual property operating statements, 1- to 5-year cash-flow analysis, a comparison of two to six cash-flow analysis alternatives (for the same or different properties), and investment graphs.

Let's say you own an apartment building. From a menu, you would select which types of apartments you have (studio, one-, two-, three-, or four-bedroom), filling in the number of units, square footage, and monthly rent for each. The program would return your gross scheduled income, total square footage, and rental rates per square foot for each apartment as well as for the building. This package also includes the ability to handle balloon payments, capital additions, and split-down payments. (Coral Software, Ltd., P.O. Box 18563, Seattle, WA 98118; (206)722-8410 \$249 (\$10 demo disk) for PC, XT, and compatibles; requires 256K RAM, DOS 2.0 or later).

Purchase Order is a menu-driven program for creating, storing, and printing standard one-page purchase orders. Fields are provided for your company name, vendor name, bill-to and ship-to addresses, resale number, order and required dates.

This Purchase Order sample shows borders around data groupings

terms, shipping, comments, and up to 12 line items per order. Information that doesn't change from one purchase order to the next can be set to appear automatically, keeping typing to a minimum.

You can print the purchase orders with or without borders around the various groups of information, so you can use either plain paper or preprinted purchase order forms; as many copies as needed can be printed at one time. You can also print a handy report listing order numbers, vendors, and dates ordered and closed. (Del Mar Technology, Del Mar, Calif.; (619) 457-0936; \$39.95; requires 128K RAM, one disk drive. DOS 2.1.)

PathMinder is a fast, feature-laden, visual shell for DOS that facilitates file and subdirectory use and maintenance. The top two lines of *PathMinder's* screen form a horizontal bar menu of about 24 options that include Run a .COM, .EXE, .BAT, or .BAS file; Erase, Rename, or Move a file; Make or Remove a subdirectory; and Sort files by name, extension, date/time, or size. One option, which loads commonly used applications from a menu with single keystrokes, is pure gravy.

The remainder of the screen is divided in half. The left side

lists directories and filenames along with extensions and size. As you open directories, their filenames are indented in the list. You can highlight a directory or filename and then apply any command from the menu to it. The right side of the screen lists special-purpose keys and help and error messages.

PathMinder has some nifty features, such as logging the time spent with each program into separate accounts for up to nine users. Its full-screen editor is an excellent alternative to EDLIN, offering such basic word processing features as search and replace, block functions, and formatting. (Westlake Data Corp., Austin, Tex.; (512) 474-4666; \$49.95; requires 128K RAM, DOS 2.0 or later). ■

There are probably more than a hundred pop-up calculator programs on the market, some of which can even imitate, to greater or lesser degree, such programmable calculators as the HP-11C. The *KSH-1 Scientific Calculator* is among the best of these, providing more functions than the popular HP-11C while running at a faster speed. One advantage of *KSH-1* is not having to retype the results of calculations into your computer—this program is RAM-resident, so you can call it up in the middle of, say, a 1-2-3 worksheet, perform calculations, and pop the answers into the worksheet automatically.

If you're not used to Reverse Polish Notation, *KSH-1* may seem strange at first, but it doesn't take long to learn. To make things a little easier, all four stack registers can be viewed at the same time. A wide range of scientific and engineering functions are included on the rather crowded screen display, which is accurate to 18 digits. Within a programmed equation, the software allows up to 512 steps. The program will even work with a Microsoft mouse. (K Software House, Unionville, Tenn.; (615) 294-5090; \$49.95; requires 64K RAM, one disk drive. DOS 2.0 or later.)

The menus and options screen from *PathMinder*

1-800-426-6659

eleven

A Division of CW Marketing, Inc.

Your Hardware and Software Source

Save Up To 60%

★ **NOW Even Lower Prices** ★

★ NO CHARGE FOR VISA AND MASTERCARD ★

★ OUR CUSTOMERS HAVE RATED US #1 IN PRICE & SERVICE ★

★ CORPORATE & INSTITUTIONAL PURCHASE ORDERS ACCEPTED ★

★ CALL FOR DETAILS. ★

**Low Prices Are BORN Here
RAISED Elsewhere**

- Just Ask Our Competitors!!! -

FREE
AIR EXPRESS SHIPPING
See Details Below

SOFTWARE

DATA BASE MANAGEMENT

RISK RANKING		
Crash	.....	5
Cost 2	.....	2
Cost 1	.....	2
Cost 3	.....	2
Cost 4	.....	2
Cost 5	.....	2
Extended Report Writer	.....	1
Knowledgeplan	.....	2
Knowledgeplan II	.....	2
Knowledgeplan Upgrade Kit	.....	1
Teuscher	.....	1
IMP 5	.....	1
Quade Report	.....	1
Quade Report	.....	1
Quade Report	.....	1
Quade Report	.....	1
Revelation	.....	1
R Base 1000	.....	1
R Base	.....	1

Cellulose PAPER 5

PROJECT MANAGEMENT		
Harvard Total Project Manager	G	\$110
Microsoft Project	G	\$10
Super Project	\$	\$10
Timeline 20	\$	\$10
INTEGRATIVE SOFTWARE		
Electric Desk	\$	\$110
Enroute 1.1	G	\$10
Framework	G	\$10
Smart Software System	G	\$10
Symphony	G	\$10
MONEY MANAGEMENT		

MONEY MANAGEMENT

Donors & Service & Finance 3
 Home Accountant Plus 1
 Topics Managing Your Money 1

HARDWARE

Source:

KEYBOARDS	
AS/4 Split Keyboard	\$ 3
AS/4 Advantage	2
Evening Board	6
Heaven Color Card	1
Heaven Graphics Card	1
Passport Modular Graphics Card	2
Passport 5 Pack	1
Quattro	2
Temple Graphics Module	4
Temple Captain (No Memory)	1
KEYBOARDS Keyboard \$150 \$1	

COMPUTERS

Serve	=====	Cat
Dish	=====	Cat

- We Charge for VISA and Mastercard
- We Are Approaching 1700 Yr. in Business 10 to 15 Bk.
- You Pay The Ground - We Pay the Air
- Shipping and Handling Add \$8.00
- Personal and Company Checks Well Delay 3
- Please Be Available Subject to Change With
- Due to Copyright Laws No Returns on Some
- Not 24 Hr. C.D.O. Orders
- We Do Not Guarantee Machine Com

- Order Line Hours: Mon-Fri: 8:30-5:30 Saturday 9:30-1:00
- Order Processing: 800-224-9345
10:30 a.m. - 3:00 p.m. Monday - Friday

Mailing Address
2122 East Indian School Road
Phoenix, Arizona 85016

CIRCLE 170 ON READER SERVICE CARD

Canon
<<PC>> PERSONAL COPIERS

Canon PC-10 \$ 649
 Canon PC-20 \$ 759
 Canon PC-25 \$ 395

New on the Market

Matrix PCR

This desk-side color film recorder allows the user to record graphics and other computer displays on photographic film. It accepts Eastman Kodak's Instagraphics instant 35-mm slide film and automatically ejects completed slides, making slide production fast and inexpensive.

Designed to use 35-mm film, the Matrix PCR can reproduce computer-generated images that contain over 4 million separate pixels, each capable of assuming any one of 16 million colors and shades. The clarity of the photographic image is further en-

hanced by Matrix Instruments Inc.'s proprietary raster processor, which eliminates raster lines or jagged edges from images. The raster processor also provides sharp character fonts with such programmable characteristics as proportional spacing, colored outlines, drop shadows, and gleaming highlights.

The Matrix PCR is compatible with all major graphics software and produces all slides at a resolution of 4 million pixels, no matter what the resolution of the terminal on which the image was created. Other features include front-panel controls and a status



SAR-10 Voice-Plus Board,
NEC America
Inc.

display, which the user can override by software control. Self-calibration, film settings, and diagnostics are handled by a built-in microprocessor: film loading, exposure, and film advance can take place in standard office lighting.

List Price: Available from the manufacturer

Matrix Instruments Inc.
1 Ramland Rd.
Orangeburg, NY 10962
(914) 365-0190
Telex: 685-3232

Circle 650 on Reader Service Card

that's better than 1/4 inch between light beams.

The Addressable Touch Panel's box frame design has a shallow profile, permitting it to be used between a CRT screen and enclosure with many monitors.

List Price: \$98

Electro Mechanical Systems Inc.
801 W. Bradley Ave.
Champaign, IL 61820
(217) 359-7125

Circle 652 on Reader Service Card



Matrix PCR, Matrix Instruments Inc.

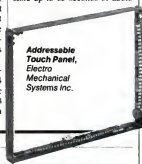
Addressable Touch Panel

Electro Mechanical Systems Inc. announces a low-cost infrared touch panel that is suitable for use with most 12- and 13-inch monochrome or color monitors. The Addressable Touch Panel creates an invisible matrix of infrared light beams in front of the display screen. Addressing and scanning of the touch panel is carried out by the software within the host computer, which determines the relative location of a finger or stylus interrupting beam paths across the screen.

The optical matrix of the Addressable Touch Panel is 24 points by 40 points in an active area of approximately 6 by 8 inches, yielding a resolution

SAR-10 Voice-Plus Board

NEC America Inc. has introduced a fully integrated voice recognition and response system that uses a custom LSI chip set with a 250-word vocabulary. The board incorporates 256K bytes of dynamic RAM, allowing it to store up to 65 seconds of audio



Addressable Touch Panel,
Electro
Mechanical
Systems Inc.

New on the Market Submissions Guide

All submissions to New on the Market should follow these guidelines:

1. Include the retail price and details of both hardware and software needed for an end-user to properly use your new product. This includes required amount of RAM, number and type of drives, operating systems supported, and peripheral equipment needed.
2. Releases should be typewritten double-spaced on one side of the paper. Copies of advertisements may be included, but in most instances we need more information than is typically included in an ad. Include telephone contacts for marketing and technical questions.
3. If available, include black & white glossy photos of the product, 4 by 5 inches or larger.

New on the Market does not review products; do not send sample or demo copies of software. All product announcements are run on a space-available basis, at the exclusive discretion of the editor. Please note that it is impossible to guarantee publication of a product announcement for any particular issue.

responses. The utility software included with the board allows the SAR-10's voice input and output capabilities to be easily integrated with the user's existing software, creating a virtual voice keyboard.

List Price: \$1,495
NEC America Inc.
 8 Old Sod Farm Rd.
 Melville, NY 11747
 (516) 753-7000
 Telex: 14-4858

Circle 653 on Reader Service Card

Compu Station Cabinet

This compact, space-saving workstation from Constant Data Design Inc. places all the components of a complete PC system within a single lockable cabinet. The cabinet features a large printer drawer that can slide out from either the left or right side of the unit and a keyboard shelf with sliding leaves that extend to 47 inches wide.

The Compu Station Cabinet also includes three adjustable shelves for the monitor and systems unit and a built-in 25-watt light. When closed, the customer-mounted cabinet measures only 22 inches deep, 30 inches wide, and 59 1/2 inches high.

List Price: \$995
Constant Data Design Inc.
 19 Tyson Pl.
 Bergenfield, NJ 07621
 (201) 384-8600

Circle 655 on Reader Service Card

AT&T Truevision Video Display Adapter

Television-quality images can now be displayed on IBM-standard RGB color monitors with this plug-in board from AT&T. Called the Truevision Video Display Adapter with Digital Enhancement (VDA/D), the board can display up to 1,008 colors on digital RGB monitors previously limited to 16 colors.

The VDA/D board incorporates eight built-in color maps, each of which contains 256 colors from a combined palette of over 32,000 colors. Four of these maps can be used simultaneously to display up to 1,008 colors, permitting photographic images instead of cartoonlike graphics to be shown on IBM-standard mon-



Compu Station Cabinet, Constant Data Design Inc.

itors. VDA/D images can be stored as DOS-compatible files and can be transmitted over communications lines to add high-quality graphics to teleconferencing, electronic mail, and other similar data transfers.

List Price: \$695
AT&T Electronic Photography and Imaging Center
 2002 Westley Blvd.
 Indianapolis, IN 46219
 (317) 352-6120

Circle 656 on Reader Service Card

SpectraSCAN Digital Copiers

LaserFAX Inc. has announced two digital copiers capable of scanning photographs, artwork, and documents for storage on a hard-disk-equipped PC. Unlike digitizing cameras, the SpectraSCAN 200 and DS-200 units are based on a scanning method similar to that of photocopyers, which requires minimum expertise from the user. With the SpectraSCAN 200, color copy in sizes up to 8 1/2 by 14

inches can be scanned at resolutions up to 200 lines per inch. The DS-200 model is designed for black-and-white copy only.

Two plug-in boards also offered by LaserFAX Inc. take advantage of the advanced features of the SpectraSCAN copiers. The first, the LaserFAXimile card, allows the scanners to communicate with standard facsimile equipment. The second board, the LaserFAX TEXreader, allows documents scanned by the SpectraSCAN 200 and DS-200 to be read into a word processing or database program without additional intervention.

List Price: Available from the manufacturer
LaserFAX Inc.
 2000 Palm St. South
 Naples, FL 33962
 (813) 77-LASER
 (813) 774-7880

Circle 657 on Reader Service Card



SpectraSCAN Digital Copier, LaserFAX Inc.

Hexace Color Card

Hexace Technologies Inc. has introduced a half-sized RGB color/graphics adapter. Features include a built-in light pen interface and composite video port. Making extensive use of VLSI chips, the Hexace Color Card accommodates standard 320-by-200-pixel medium-resolution color images, as well as 640-by-200-pixel high-resolution monochrome graphics.

The board can be used in any IBM PC slot—including the short slots of the PC-XT—with-out lateral overlap. Available options include a parallel port.

List Price: \$199; with parallel port, \$229
Hexace Technologies Inc.
 271 N. Mathilda Ave.
 Sunnyvale, CA 94086
 (800) 654-7656
 (408) 730-4457

Circle 654 on Reader Service Card

The Resume Disk

Mt. Lookout Software's new program allows you to design, update, and store your résumé on disk as an executable file. *The Resume Disk* presents you with prompts for all relevant data, including career objective, work experience, in-depth information on responsibilities and accomplishments, as well as personal and educational data. All entries can be upgraded at any time with either the program itself or any ASCII work processor.

List Price: \$39.95
Requires: 64K RAM, one disk drive, DOS.

Mt. Lookout Software
 P.O. Box 26096
 Cincinnati, OH 45226
 (513) 871-5222

Circle 647 on Reader Service Card

EasyTax

This collection of templates for Lotus's 1-2-3 is designed to simplify the task of preparing federal income tax returns and aid in planning tax strategies for the coming year. The templates recreate on-screen actual federal tax forms and schedules that can be easily printed.

Included within *EasyTax* are Forms 1040, 1040-ES, 2106, 2441, 3903, 5695, and Schedules A-E, G, R, SE, and W. All forms and schedules are integrated, automatically posting data onto all needed forms from a single entry. The software also performs logical calculations such as capital gains distributions and alternative minimum tax. It has logic and IRS rules built into the program, automatically limiting deductions, for example, to legal maximum limits and calculating

correct exemption deductions.
List Price: \$79; yearly updates, \$25

Requires: 256K RAM, two disk drives, DOS, Lotus's 1-2-3.

Valley Management Consultants

3939 Bradford Rd., #1
 Huntingdon Valley, PA 19006
 (215) 947-2507

Circle 646 on Reader Service Card

FDX Fixed Disk Accelerator

Hard disk users who'd like to improve the performance of their drives might look to this board from Cogent Data Technologies Inc. when upgrading their systems. The FDX Fixed Disk Accelerator board uses an advanced cache algorithm with full-track read-ahead and overlapped data transfer, providing dramatic speed gains of up to 20 percent in some cases for disk-intensive applications. It can control up to two hard disk drives and permits each drive to be partitioned into as many as four virtual DOS drives of up to 32 megabytes each, allowing the user to take advantage of Winchester's with very large storage capacities.

The FDX Fixed Disk Accelerator can be used in networked applications, including the IBM PC Network and others running under PC-DOS 3.1. It incorporates an event-driven multitasking operating system running on an Intel 80186 coprocessor, allowing the simultaneous

processing of multiple disk I/O commands in a network environment. The board can be used with any Winchester drive using the ST-412 interface standard.

List Price: \$595

Cogent Data Technologies Inc.

175 West St.
 P.O. Box 926
 Friday Harbor, WA 98250
 (206) 378-2929

Circle 649 on Reader Service Card

HP ColorPro Plotter

Hewlett-Packard Co.'s new eight-pen HP ColorPro Plotter supports over 100 existing graphics software packages. The HP ColorPro offers a fine-line resolution of .001 inch and features a ROM cartridge slot that allows it to be user-upgraded to meet future needs.

The plotter's mechanical arm maneuvers color fiber-tip pens at the rate of 15.7 inches per second. Pen selection is made from an eight-pen carousel via front-panel controls or software commands. When returned to the carousel, pens are automatically recapped to extend their useful life.

The HP ColorPro Plotter is available with either an RS-232 or IEEE-488 serial interface and weighs less than 12 pounds. Supplies available for the plotter include fiber-tip pens in two widths and ten colors for paper (seven



HP ColorPro Plotter, Hewlett-Packard Co.

colors for transparencies), regular and glossy surface paper, and fast-dry transparent film.

List Price: Available from manufacturer

Hewlett-Packard Co.

Contact an HP sales office listed in your local white pages.

Circle 641 on Reader Service Card

Modula-2 Bulletin Board

A national bulletin board to provide information and services on the Modula-2 programming language has been established by Interface Technologies Corp. Callers may ask questions, receive answers, exchange programs, and receive updated releases of Modula-2 software. The service supports modem communications at 300, 1,200, and 2,400 bits per second. For best results, Interface Technologies Corp. recommends that communications parameters be set at 8 bits and no parity, though the bulletin board also accepts 7 bits and even parity.

Interface Technologies Corp.
 3336 Richmond Ave., #200
 Houston, TX 77098
 (713) 523-9422
 (713) 523-7255 Modems only

Circle 640 on Reader Service Card

FirTime for dBASE III

Spruce Technology Corp. has released a version of its syntax-oriented editor specifically designed

for use with dBASE III. With *FirTime* for dBASE III, the user can outline a program's logic and then fill in details. The editor automatically checks code for errors as it is written, providing both a clearly understandable error message and a cursor placement at the point of error. It accepts existing programs as well as new ones.

FirTime for dBASE III also incorporates an automatic statement generator, accessible via the PC's function keys. The statement generator enters the appropriate statement into the user's program, leaving space for the user to enter data item names or other variables to complete the statement.

Other versions of *FirTime* are available for Turbo Pascal, Microsoft or IBM Pascal, and Microsoft or Lattice C.

List Price: \$125
Requires: 256K RAM, two disk drives, DOS, dBASE III.
Spruce Technology Corp.
 189 E. Bergen Pl.
 Rad Bank, NJ 07701
 (201) 741-8188

Circle 645 on Reader Service Card

Sony Large-Size CRTs

Sony Corp. has announced two large-size monitors—a 28-inch monochrome CRT featuring a 20- by 20-inch viewing area, and a 28-inch color CRT designed primarily for Hi-Vision or HDVS (High-Definition Video System)



FDX Fixed Disk Accelerator, Cogent Data Technologies Inc.

applications. The monochrome CRT has an aspect ratio of 1 to 1, permitting it to be used in such applications as CAD/CAM processing of large drawings, medical diagnostic image analysis, mapping, and other situations that require handling of high-data-density images. It has a horizontal resolution of 2,210 dots and can display up to 70,000 alphanumeric characters at one time within an 8- by 8-dot-per-character matrix.

The wide-format color CRT has a horizontal resolution of 1,680 dots and can display 33,000 alphanumeric characters. Its 20- by 20-inch viewing area has an aspect ratio of 3 to 5.

List Price: Available from the manufacturer

Sony Mfg. Co. of America
16450 W. Bernardo Dr.
San Diego, CA 92127
(619) 487-8500

Circle 644 on Reader Service Card

Custom File

This relational database manager from Custom Data is designed to be RAM-resident, giving it fast execution times for all functions. *Custom File* supports both variable- and fixed-length data fields, as well as character, numeric-only, date, dollar, decimal, floating-point, and right-justified data types. A database can have as many as 500 fields, any of which can be used for searches or sorting. Other features include on-line help and tutorial systems and a built-in custom report generator.

Three versions of the program are currently available, while additional, customized vertical-market versions will become available in the near future.

Package 1 provides the software and printed user guide, *Package 2* adds 5 calls (60 minutes total) for telephone support, and *Package 3* allows unlimited telephone support and provides free periodic updates.

List Price: \$50-\$225, depending on package; demo disk, \$5

Requires: 320K RAM, one disk drive, DOS.

Custom Data
P.O. Box 1408
Salt Lake City, UT 84110
(801) 322-0708

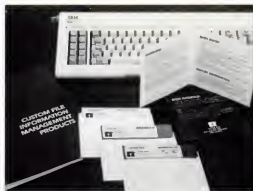
Circle 643 on Reader Service Card

Alps P2000 Printer

The Alps America division of Alps Electric (USA) Inc. has introduced a rugged dot matrix printer designed for high-volume printing applications. The Alps P2000 offers three print speeds: 250 characters per second for drafts, 125 cps for memo-quality documents, and 50 cps for near-letter-quality. At all three speeds, the printer's nine-pen head produces a resolution of 144 by 240 dots per inch, with a noise level of less than 55 decibels.

The P2000 uses interchangeable typeface cartridges. Each cartridge provides a broad selection of pitches and typeface variations, such as bold, condensed, extended, superscript, subscript, and double-strike, selectable either through software control or with the printer's front-panel switches. A 4K-byte buffer, expandable to up to 260K bytes, is standard.

The unit's wide carriage can print 136 columns across, and both friction and tractor feed mechanisms are built in as standard equipment. Optional equip-



Custom File, Custom Data

ment for the printer includes multiple interfaces and a cut-sheet feeder.

List Price: \$995

Alps America
3553 N. First St.
San Jose, CA 95134
(408) 946-6000

Circle 648 on Reader Service Card

Avatar 4000 Networking System

Avatar Technologies Inc.'s local area networking system can link together a diverse mix of personal computers, mainframes, minis, and peripheral equipment using multiple-ring architecture over common twisted-pair wiring. The network supports simultaneous asynchronous and synchronous communications at speeds up to 19,200 bits per second. Devices connect to the system with standard RS-232 serial interfaces.

The Avatar 4000 Networking System can be configured with as many as four independently controlled rings, each of which can support up to 64 discrete channels when separately partitioned into eight subrings. Rings can be arranged in starred, concentric, or overlapping configurations. Devices, users, or rings can be added, removed, or changed without disruptions to normal operations.

The LAN system consists of three major elements: the Network Controller, which provides centralized communications and performance monitoring for the

system; the Network Interface Unit, which provides the physical connection to the network and is available in either single or multiple port configurations; and the Device Interface Unit, which provides user access to the LAN by establishing and terminating connections between the user's device and the LAN's communications channels. Each of these three elements is available in a variety of models that allow users to customize the LAN for particular environments.

In addition to the major elements, the Avatar 4000 Networking System provides a number of optional features, including:

- Up to 64 central communications interfaces (CCIs) for controlled access to host mainframe ports, modems, multiplexers, and so forth.
- Up to 32 subring switches to control, monitor, and maintain subring performance and signal quality.
- Redundant ring controllers and power supply.

Other products available from the manufacturer link the Avatar 4000 Networking System to the IBM 3270 SNA and Bismyn networks, as well as to Sperry computing equipment.

List Price: Starter system, \$2,000

Avatar Technologies Inc.
99 South St.
Hopkinton, MA 01748
(617) 435-6872
TWX: 710-390-0375

Circle 642 on Reader Service Card



Avatar 4000 Networking System, Avatar Technologies Inc.

InfoWorld on EasyLAN
 "Any product that brings
 down the cost and improves
 the ease of use for LANs is
 for the better."

Buy A Local Area Network For Less Than \$100 Per PC

STOP buying expensive duplicate PC peripherals. Usually your peripherals just sit idle. If your office owns two or more PCs can you justify a costly printer and multiple disk drives for each PC? How often are your printers actually busy? Thirty minutes a day? An hour a day? Even your expensive hard disk is used infrequently.

The obvious solution to avoid expensive duplicate peripherals is a local area network that allows you to share printer and disk drives. But until now LANs have cost in excess of \$1,000 per PC.

INTRODUCING THE EasyLAN™ OFFICE NETWORK

EasyLAN shares printers and disk drives between IBM PCs. EasyLAN can save you \$1,000 or more per PC by eliminating duplicate equipment purchases. EasyLAN advantages:

- EasyLAN shares printers, disk drives, and information
- Easy to justify—less than \$100 per PC
- Easy to install
- Easy to operate
- Easy to order
- EasyLAN performs in the background.

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solution for less than \$100 per PC including cables and software. At this price, the RISK IS LOW, and the BENEFITS ARE HIGH.

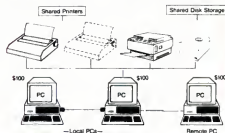
EasyLAN performs its operations concurrently in the background. EasyLAN communications, file transfers and printer operations all take place while each PC simultaneously performs such normal DOS applications as Lotus 1-2-3, WordStar, and dBASE.

EASY TO OPERATE

EasyLAN network software allows PC users to share printer and disk peripherals. PCs are connected by EasyLAN cables plugged directly into your PC's standard serial communication ports and EasyLAN can be used with digital PBXs. EasyLAN supports geographically separated PCs using modems and dial-up lines.

EasyLAN's performance meets your small office requirements to move word processing documents and spread sheets between PCs. For example, EasyLAN can move a 10 page document between two PCs, as a background operation, in less than one minute!

EasyLAN loads automatically at boot time. It manages the PC's serial and parallel ports for



EasyLAN Office Network

communications and printing. All EasyLAN operations may be started from any connected PC.

Printer sharing operates transparently with existing programs. Print files are automatically written to disk and scheduled for printing. Multiple printers per PC may be designated for specific office tasks.

For example, one PC can interface with Printer 1 for general purpose output, with Printer 2 for continuous-form letterhead stationery, and with Printer 3 for printing continuous-form invoices.

Disk sharing uses EasyLAN's COPY command, EASYCOPY,™ to move files to and from PCs. Files are stored or retrieved from disk storage and the Directory is updated. The high-capacity benefits of just one hard disk can now be shared by several PCs.

All communication operations are protected by a unique password assigned to each PC so security is maintained.

EASY SPECIFICATIONS

Each PC in the network requires an individual copy of the EasyLAN software, 128K of memory, a serial communication port(s), and DOS 2.0 or above. For your convenience, EasyLAN diskettes are not copy protected. EasyLAN runs on all IBM PC models (PC, XT, AT, and Jr) and compatible PCs.

"I look for those products that make my job easier and save me and my company money. I believe EasyLAN does both."
 Carl Warren
 Editor, Mini-Micro Systems

EASY TO INSTALL

EasyLAN can be installed in less time than it takes to enjoy your coffee break. Just plug the EasyLAN cables into existing serial ports. EasyLAN's PRINT, COPY and DIRECTORY commands are very similar to DOS commands.

EASY TO ORDER

EasyLAN is immediately available and easy to order. For a two PC network, start with the EasyLAN Kit. For each additional PC in the network, order the EasyLAN Expansion Kit.

The EasyLAN Kits include program diskettes, manuals and cables, which are shielded to maintain signal quality. All parts are warranted for one year. EasyLAN program diskettes may be purchased individually; you supply your own cables, modem links or PBX connections.

ORDER EasyLAN TODAY. 1-800-835-1515

Server Technology, Sunnyvale, CA 94086 408/738-8377

Name _____
 Shipping Address _____

 City _____
 State _____ Zip _____
 Telephone (_____) _____
 Payment: USA—Visa, MC, Check, PO No COD
 Out of USA—US & Bank Draft
 Name on Credit Card _____
 Credit Card No. _____
 Card Expiry Date _____

EasyLAN Order Form

EasyLAN Kit—for 2 PCs:
 One 30' Cable, Two Diskettes,
 and Manuals.

Price \$179.95

Qty

Amount

EasyLAN Expansion Kit—for each additional PC:

One 30' Cable, Diskette and Manual

Price \$109.95

EasyLAN Diskette and Manual

Price \$ 79.95

EasyLAN Cable—30'

Price \$ 49.95

Custom length cables. Call for quote.

CA resident tax 7%

Shipping Charge: USA \$5.00

Out of USA \$15.00

TOTAL ORDER

\$

For Ordering or Configuration Help Call Toll Free

1-800-835-1515

In California call 408/738-8377 MasterCard and Visa Accepted

1065 E. Duane, #107
 Sunnyvale, CA 94086
 908/738-8377

EasyLAN

We have over 1000 Software and hardware items in stock. Shipments on almost all items within 24 hours!

Call for programs not listed

WAREHOUSE DATA PRODUCTS

TOLL-FREE ORDER LINE 1-800-421-3135

SOFTWARE

DATA BASE MANAGERS

Clipper	\$345
Clout 2	129
Conдор III	299
Fox and Geller Quickcode	145
Fox and Geller Quickreport	145
Knowledgeman	225
Knowledgeman II	309
K Paint	60
K Graph	135
K Text	105
K Report	135
Nutshell	55
PPS: File	78
Power Base 2.1	199
RBase 5000	Call
Think Tank	98
Tim IV	199

WORD-PROCESSING

Easy (Micro Pro)	89
Leading Edge w/Merge	85
Microsoft Word	225
Multimate 3.31	205
Multimate Advantage	255
Quia Word Plus	145
Peashtext 5000	145
PPS: Write	78
Random House Spell Checker	36
Semna III 3.0	295
Volkwriter Deluxe	139
Word Perfect 4.1	170
Wordstar	238
Wordstar Propac	238
Wordstar 2000	238
Wordstar 2000+	285

SPREADSHEETS

Microsoft Multiplan	115
PPS: Plan	78
Supercalc II	145
Supercalc III 2.1	189

ACCOUNTING

BPI Accounts Payable	299
BPI Accounts Receivable	299
BPI General Accounting	299
BPI Payroll	299
Cyme	95
Dollars and Sense	Call
MBSI	Call
Tobias Managing Your Money	84

TCS. Big Four equivalent of Peachtree Series 4 - Specially augmented and customized for your IBM PC Terminal and Printer - GL, AR, PA, AP, CP/M-80, CP/M-86 for PC XT, DOS 1.1, 2.0
Each Module \$65 For All Four \$249

INTEGRATED

Enable Smart Software	Call
-----------------------	------

TRANSFER PROGRAMS

Crostalk XVI	89
Hayes Smartcom II	68
Microsoft Access	149
Move-It	79
Remota	99

GRAPHICS

Chartmaster	215
Dr. Halo II	99
Ennergaphics w/o Plotter	170
Ennergaphics w/Plotter	220
Entrix	99
Graphmaster Combo	315
Microsoft Flight Simulator	30
PC Paint Brush	89
PPS Graph	78
Signmaster	135

INCREDIBLE VALUE!

Nationally advertised boards for IBM PC and compatibles at giveaway prices.

1 year warranty

5151 Equivalent Keyboards	\$89
Hercules Graphic Board Equivalent with Parallel Port	\$99
Expansion Board 0 to 576 K	\$59

AST Six Pack Equivalent with game port	\$99
Four Drive Floppy Controller	\$45
Color Card without printer port	\$79
Color Card with printer port	\$95

IBM PC CLONE	
256K Expandable to 640K on the motherboard, 2 drives 7 expansion slots	\$650

LANGUAGES

Concurrent PC/Dos	Call
Fortran 77	208
Lattice C Compiler	248
Run C Interpreter	99
Microsoft C Compiler	239
Microsoft Fortran	209
Microsoft Macro Assembler	89
Microsoft Pascal Compiler	178
Microsoft Quick Basic	65
Multi Halo	140

UTILITIES

Copy II PC	19
Copy II PC Board	75
Copywright	45
Norton Utilities 3.1	52
PC Tools	22
Prokey 4.0	75
Superkey	35

HARDWARE

BUYS OF THE YEAR

Expansion Board 0 to 576K	\$59
KB5151 Keyboard Equivalent	89
Hercules Graphic Board w/Par Port Equivalent	115
AST Six Pack Equivalent 1 Year Warranty	115

HARD DRIVES

Bernoulli 20 MB w/ H.	2499
Seagate 20 MB Internal w/Controller	499
Turbo 10 internal	529

MODEMS

Anchor Express	235
Hayes 1200	Call
Hayes 1200B w/Software	Call
Hayes 2400	245
Promodem 1200B w/Software	265
Promodem 1200	309

RAM

64K 150NS Chips (Set of 9)	6.50
256K 150NS Chips (Set of 9)	27

BOARDS

AST Advantage	395
AST Sixpack (354K)	249

HARDWARE

Hercules Color Card	145
Hercules Graphics Card	289
J RAM III	Call
Paradise Five Pack	118
Paradise Modular Graphics Card	249
Quadram Board with Par/Ser and Game Port	199
Quadcolor I	185
Sigma Maximizer Multifunction	148
Sperny 512K Expansion w/128K	145
STB Chameleon Board	249
STB Mono Board	155
AB Parallel Print Switch w/cables	75
Mini Micro Parallel Print Buffer	89

COMPUTERS

Corona PC	Call
Sperry PC Mono 256K Dual Drive Serial Port, Clock, MS/DOS 2.11	\$1850

IBM PC-AT	Call
ITT Computer PC Compatible 256K Dual Drive, Mono, MS/DOS	1395

ITT XP 60286 IBM/PC Compatible, 512K, 10 MB Winchester, 3 times faster than an XT, 30% faster than an AT	\$2850
--	--------

Kaypro 2000 786K	\$1695
Kaypro 16" w/external color monitor	1695
Zenith 171	Call

PRINTER

FREE! PRINTER SET SOFTWARE
Purchase an Okidata, Epson, Gemini, Citizen or Toshiba printer and receive at no charge a menu driven program to set print characteristics or to make your computer function as a correcting typewriter. Retail value \$35. Available for most disk formats

CITIZEN	
MSP-10	298
MSP-15	355
MSP-20	329
Citizen 1200	199
Pearlman 35 Daisywheel	415
EPSON - Call on all models	
JUKI	
Juki 5100	340
Juki 6300	685

NEC	
3550	989
8650	1340
P5 Parallel	995
EP 3600	398

OKIDATA - Call on all models	
PANASONIC	
1091	239
1092	340
1093	429
KXP351	410

STAR MICRONICS - Call for prices	
TOSHIBA	
1340	499
P351	1049
P341	875

MONITORS

AMDEK - Call for prices	
Taxman 610	319
Taxman 121 Green	125
Taxman 122 Amber	134
Princeton Max 12	170

TIW/MS: prices include 3% cash discount. Add 3% for charge and C.O.D. orders. Shipping on most software \$5.00. AZ orders 4% sales tax. Personal check - allow ten (10) days to clear. Prices are subject to change. We accept purchase orders.

TOLL-FREE ORDER LINE 1-800-421-3135

WAREHOUSE DATA PRODUCTS

2701 West Glendale Ave. • Phoenix, AZ 85021



Solving Cash Flow Problems Using 1-2-3 and Symphony

Users of Lotus's 1-2-3 and Symphony will find this guide to cash-flow problem-solving a welcome aid. Based upon the best-selling *Cash Flow Problem Solver*, by Bryan Milling, *Solving Cash Flow Problems Using 1-2-3 and Symphony* offers tested techniques for monitoring a company's cash flow and identifying common problem areas. Included within the guide are 23 formats for in-depth calculations; the emphasis is on meeting expenses, retiring liabilities, main-



taining a cash reserve buffer, and expanding total cash flow. Crucial elements of component, structural, and leverage management methods are studied in a logical progression, with comparisons of the relative strengths of each method.

Cover Price: \$19.95
Chilton Book Co.
 Radnor, PA 19089
 (215) 964-4758

Circle 700 on Reader Service Card

Computer Aided Selling

This monthly newsletter from The Denali Group Inc. reviews computer products and services. It also reports on new developments in computer applications tailored to the needs of sales personnel.

Yearly Subscription: \$87
The Denali Group Inc.
 1111 Third Ave., 7th floor
 Seattle, WA 98101
 (206) 382-6668

Circle 699 on Reader Service Card

PC/VME Link

Ultralink International's PC/VME Link provides a direct connection between the IBM PC and VME 16/32-bit systems. Through the use of this interface, PC and VME systems can be configured in several modes, including the use of the PC as a VME controller with access to all VME memory address space. Alternatively, the PC can share the VME bus with other VME processors, generating VME interrupts at user-selected levels. Data transfers between the PC and VME systems can be made directly from the PC's memory space, via a parallel data path with parity checking and optional optical isolation.

The PC/VME Link consists of two circuit boards connected by ribbon cable. One card is installed in any expansion slot of the PC; the other fits into any VME bus enclosure. The two systems can be separated by up to 50 feet, permitting use in hostile or otherwise widely differing environments.

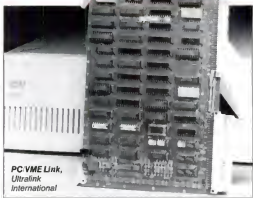
List Price: \$845
Ultralink International
 1091 Airport Rd.
 Minden, NV 89423
 (702) 782-9758

Circle 698 on Reader Service Card

Attachmate 3-N-1 3270 Coax Adapter

This plug-in board from Attachmate Corp. can operate as three different PC-to-mainframe communications adapters, emulating the DCA-IRMA board, the IBM 3278/79 Emulation Adapter, and the Multisession Adapter used in the IBM 3270-PC. Aside from its compatibility with existing software for the DCA-IRMA board and the IBM 3278/79 Adapter, the Attachmate 3-N-1 3270 Coax Adapter includes an emulation program permitting the user to configure a PC as a basic IBM 3270 terminal/printer or a fully functional 3270-PC.

The board supports the IBM Type-2 coax protocol. It can be connected directly to an IBM 3274/76 Controller, with support for both single-session CUT or multisession DFT environments. In its 3270-PC emulation mode, it supports such 3270-PC charac-



teristics as concurrent notepads, windowing, and compatibility with the TSO/CMS/CICS operating systems.

List Price: \$1,195
Attachmate Corp.
 3241 118th SE
 Bellevue, WA 98005
 (206) 644-4010

Circle 697 on Reader Service Card

Techtran

PC users wishing to buy or sell computer equipment can call a toll-free nationwide telephone number to reach this listing service. Sellers are charged a low one-time fee to list their merchandise until the equipment is sold. Buyers can deal directly with sellers, eliminating brokers' fees or additional advertising costs. Techtran Inc. lists all types of computers, peripherals, software, expansion cards, and accessories.

List Price: \$29 per listing
Techtran Inc.
 2282 Massachusetts Ave.
 Cambridge, MA 02140
 (800) TECTRAN
 (617) 868-0353

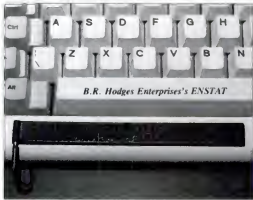
Circle 696 on Reader Service Card

ENSTAT

This adhesive-backed plastic strip is designed to conduct static electricity to ground safely without conscious effort by the user. Affixed to a location on the keyboard, the strip can be easily disconnected from its grounding wire should it be necessary to move the keyboard.

List Price: \$11.95
B.R. Hodges Enterprises
 40 San Rafael Ave.
 P.O. Box 1806
 San Anselmo, CA 94960
 (415) 456-3057

Circle 695 on Reader Service Card



**Give your
DOT printer
letter-quality
performance.**

**And we'll give you
a top-notch word
processing program.**

FREE!

StyleWriter™ is a unique device with a 64K data buffer and multiple type styles and sizes that upgrades your dot matrix printer to letter quality.

So versatile it even allows double underlining, proportional spacing, reverse characters, bold face and much more.

And StyleWriter works with any software program, any computer and any dot matrix printer.

**Order StyleWriter now
and receive MicroPro's
new EASY™
absolutely free.**

Now, word processing is easier than ever to use. Because Easy has the best WordStar® features in a new, simplified format. Easy includes a fully integrated Spelling Corrector making it the perfect word processor for executives and all first-time computer users.

**Unconditional
money back guarantee**

Call now to order StyleWriter for \$249 and your free software selection. If you're not completely satisfied, return both undamaged within 30 days for a full refund. Major bank cards and C.O.D. accepted.

And ask about our unique speech input system, Pronounce.™

1-800-325-9206

MicroPhonics Technology Corporation
234 S.W. 43rd Street, Renton, WA 98057

Microphonics™



WE DESCRIBE OVER 43,000 COMPUTER PRODUCTS SO YOU CAN FIND THE ONE THAT'S RIGHT FOR YOU

In the complex, ever-changing computer market you've got to play it smart. Which means making the right product choices without wasting time and money.

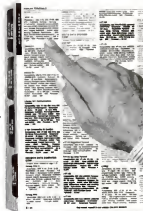
Which means **DATA SOURCES**...the one truly comprehensive reference to computer hardware and software.

DATA SOURCES puts information about 25,000 software packages, 18,000 hardware and data communications products and detailed profiles of 10,000 manufacturers right at your fingertips.

With a **DATA SOURCES** subscription you'll never have to worry about information being out of date.

Every three months you'll get a new two-volume edition—A **Hardware Volume** with descriptions of Computer Systems, Graphic Systems, Digitizers, Plotters, Printers, Disk and Tape Memory Equipment, CRTs, Expansion Boards and Data Communications Equipment PLUS a **Software Volume** with the most complete listings to be found anywhere on applications and systems software including database managers, utilities, and communications packages. A separate section includes company profiles for quick evaluation of vendors.

To subscribe, call toll-free 1-800-443-0100, ext. 251. We'll send your first two-volume edition on a 30-day approval basis and enter your one year (four editions) subscription for just \$230—more than 24% off the regular price.



**DATA
SOURCES**

**THE ONLY COMPREHENSIVE
BUYERS GUIDE TO THE
COMPUTER INDUSTRY.**
P.O. Box 5845, Cherry Hill, N.J. 08034

Put your computer slave to work now!

Computer



NO RISK
MONEY BACK
GUARANTEE

A HIGH-PRICE \$24.95 + \$3.00
BOOK 100 DETAILED BUSINESS PLANS
HUNDREDS OF THOUSANDS OF WORDS

The 100 computer businesses that will make you money now!!!

SECTION ONE

Easy to follow instructions for finding the business best suited to your personality, background and circumstances.

SECTION TWO

The money — Combined business of each business venture so you may quickly find those of greatest interest.

SECTION THREE

Full details of each business venture. What needs doing and how to do it quickly and efficiently.

SECTION FOUR

The Organizing Planner — Step-by-step instructions on how to organize each business venture from choosing the name to grand opening day.

SECTION FIVE

The Marketing Guide — How to advertise, promote and sell your services to the right people at the right time.

SECTION SIX

Capital Requirements — How much capital is needed for each business venture and if you don't have it, how you can raise it quickly.

SECTION SEVEN

Source and Resources — Thousands of names, titles, product sources, etc., you can use to get help and further information on these ventures.

WOULD A SECOND INCOME OF
\$1,000 a month . . .
\$2,000 a month . . .
\$5,000 a month come in handy?

If so, choose the amount that suits you and it's yours in exchange for a few hours of your spare time.

AND USE OF YOUR PERSONAL COMPUTER —

Join the computer revolution by cashing in with a spare time business you will enjoy, be good at and bring you financial independence.

NO MATTER IF —

Your computer is a "Commodore" from K-Mert or an "IBM-PC" with all the goodies on it or anything in between, you can use it to provide enough second income to let you live life on the leading edge, or, if you prefer just plain old laid-back lazy. Either way, you can make life fun again.

"THE COMPUTER ENTREPRENEUR" —

is the hot new book you may have read about. Over seven years in research and development — this book has 100 fully detailed business plans for you to choose from. They range from a traditional local bookkeeping service for small businesses to a far-out program for handicapping the horses that makes a substantial income — and 98 others in between.

"THE COMPUTER ENTREPRENEUR" —

is not another one of those "101 Ways" books with a paragraph or two of information about each business. Each business plan is fully detailed — how to start-up, how to operate, how to sell the service, how to keep the books, number of working hours required, capital needed, best location, city or county, etc. It even gives you a quick and simple method of determining the best kind of business for you.

"THE COMPUTER ENTREPRENEUR" —

lets you to examine without risk. You have up to three months to work with it and if not satisfied for any reason you may return it for a 100% refund.

AND YOU DON'T HAVE TO BE A COMPUTER WHIZ —

In order to start or operate these ventures. No programming or fancy special materials needed. All of these programs run from "off the shelf" programs you probably already have.

YOU CAN OPEN A WHOLE NEW WORLD OF OPPORTUNITY —

A 65 year old man in Washington State makes \$500 a day with a TRS-80 model 1 and our book, "COMPUTER ENTREPRENEUR", using report #153.

A man and wife in Arizona are making \$4000 a month using the methods in our business report #102.

A housewife in Iowa is making \$750 a month, with only a couple of hours a day, using the methods in our business report #155.

A teacher, working only in the evenings, is making \$1700 a month using the methods in business report #165.

FREE!!! SPECIAL BONUS OFFER

When you order our book "COMPUTER ENTREPRENEUR", we will include our special report.

"HOTTEST COMPUTER BUSINESSES FOR 1985", it's yours to keep even if you return the book. This report will launch you on your way to the fastest and highest cash return computer businesses for 1985. ACT NOW.

HOTTEST
COMPUTER
BUSINESSES
FOR 1985

- 901 Start an Executive Recruiting & Employment Service
- 902 Run a Computer Custom Disk Service
- 903 Sell Computerized Custom Service Programs
- 904 Be an Economic Forecaster
- 905 Start a Computer Tax Service
- 906 Market a Tax Service Rental Plan
- 907 Sell Up a Computerized Dating Service
- 908 Create Multi-Level Computer Sales
- 909 Sell Computerized Sales Leads
- 910 Be a Young Broker
- 911 Market Computerized Formula Meals
- 912 Unique Computer Reminder Service
- 913 Start a Computer Roommate Service
- 914 Publish a Computerized Advertising Cost Newsletter
- 915 Run a Computerized Press Release Service
- 916 Compile a Local Who's Who Directory
- 917 Operate a Computerized Collection Letter Service
- 918 Start a Local Market Survey Service
- 919 Sell Computerized Handwriting Analysis
- 920 Run a Computerized Astrological Chart Service
- 921 Market Computerized Sororities
- 922 Operate an Order Processing Service
- 923 Run a Free Estate Listing Service
- 924 Sell Computerized Legal Forms
- 925 Provide Computerized Loan Packages
- 926 Operate a Specialty Locating Service
- 927 Profit from Computerized Map Sales
- 928 Create Pre-Forms for New Businesses
- 929 Run a Payroll Preparation Service
- 930 Write Letters on Buy Analysis Reports
- 931 Compile Cost Estimates for Primers
- 932 Start a Home Based Locator Service
- 933 Unique Recipe Service for Restaurants
- 934 Start a Vitamin Recommendation Service
- 935 Market Computerized Energy Savings
- 936 Create SBA Financing Packages
- 937 Establish Business Values for Buyers and Sellers
- 938 Publish a Computer Newsletter
- 939 Write Start-Up Plans for New Businesses
- 940 Enter the Sports Betting Business
- 941 Start a Secretarial Service
- 942 Operate a Travel Planning Service
- 943 Sell Up Computer Schools
- 944 Become a Computer Consultant
- 945 Start an Apartment Locating Service
- 946 Locate House Rentals by Computer
- 947 Run a Typing Service
- 948 Set up a Barber Club Service
- 949 Read Records for Multi-Level Marketing
- 950 Sell Local Making Lists at \$1 Per Name
- 951 Run a Computer Classified Newspaper
- 952 Program Games for Market
- 953 Sell Stock Market Advice
- 954 Start a Bookkeeping Service
- 955 Be a Used Personal Computer Repairer
- 956 Customize Sales Letters for Salespeople
- 957 Sell Up a Computerized Corporation Filing Service
- 958 Run a Custom Electronic Mail System
- 959 Profit from Computerized Music Systems
- 960 Sell Custom Educational Programs
- 961 Start an Information Research Service
- 962 Start an Information Research Service
- 963 Start a Genealogy/Family Tree Service
- 964 Hire Children at Home
- 965 Prepare Personal Financial Statements
- 966 Plan Tips for Phrase Plans
- 967 Sell Computer Kits
- 968 Write and Sell Poetry by Computer
- 969 Start a Computer Club
- 970 Create Customized Computer Posters
- 971 Operate a Software Exchange Service
- 972 Sell a Restaurant Pricing Service
- 973 Design Crossword Puzzles by Computer
- 974 Generate Checkbooks for Profit
- 975 Sell Up a Custom Loan, Annuity & Interest Calculators
- 976 Analyze Service
- 977 Become a Personal Budget Management Consultant
- 978 Run a Menu Planning Service
- 979 Start a Coin & Stamp Collection Inventories & Value Service
- 980 Design & Sell Computer Programs for Farmers
- 981 Set Up a Personal Library Cataloging Service
- 982 Organize a Computer Labeling Service
- 983 Operate a Legal Research Service
- 984 Offer Estate Planning Services
- 985 Start a Property Analysis Service
- 986 Sell Home Place Handicapping Systems
- 987 Sell Up an Accounts Payable Service
- 988 Read Sent for Little League, Teams for Profit
- 989 Provide Cost Estimates for Remodeling & New Construction
- 990 Start a Bowling Team State Service
- 991 Catch Typing for Profit
- 992 Start a Reading Team Newsletter
- 993 Sell Inventory Controls for Small Businesses
- 994 Plan Auto Tips by Computer
- 995 Become an Investment Analysis Advisor
- 996 Analyze Home Security Systems
- 997 Provide Local Computer Shows
- 998 Run Computer Clubs for Kids for Profit
- 999 Start an Accounts Receivables and Submittal-Making Service
- 1000 Sell Computer Programming Courses

90 DAY MONEY BACK
GUARANTEE

If you're not able to make money with your home computer and the information contained in our book "COMPUTER ENTREPRENEUR" within 90 days, send the book back in saleable condition and we'll refund the purchase price in full. How can you beat that? SO, ACT NOW!

CALL
TOLL FREE
FOR
CREDIT
CARD
ORDERS
1-800-
528-3665

Name _____

Address _____

City _____ State _____ Zip _____

Please send me 1 book @ \$29.95 + postage & handling (\$2.50), total \$32.45
(California residents add 6% Sales Tax)

☐ Air Mail \$6.00 per book CASH, CHECK OR MONEY ORDER ENCLOSED

☐ Charge Card # _____

☐ Expiration Date _____ Signature _____

☐ MAIL PAYMENT & MAKE CHECKS PAYABLE TO:
Computer Information Limited

11 The Point
P.O. Box 161546
Coronado, CA 92118

Phone (619) 266-9141

DA2

If you want
to run software
with graphics on your
monochrome
monitor, we have
some bad news.

As we're sure you've been told, the only way to run software with graphics on a monochrome monitor is to buy a graphics card. For \$499, the Hercules Graphics Card runs these best-selling programs:

Ashton-Tate, *Framework*
BPS, *Overhead Express*
Lotus Development, *1-2-3*, *Symphony*
MicroSoft, *MicroSoft Flight Simulator*, *MicroSoft Word*, *MicroSoft Chart*
Software Products Int., *Open Access*
Software Publishing, *PFS: Graph*
Sorcim, *Supercalc 3*

In monochrome only.

And some good news.

For \$395, the Paradise Modular Graphics Card runs all these programs. In monochrome. And in color.

Arrays/Continental Software, *Ultra File*
Ashton-Tate, *Framework*
BPS, *Overhead Express*
Brightbill-Robert, *Graphix Partner*
Chung Labs, *GraphPlan*
Dow Jones & Co., *Dow Jones Market Analysis*
Lotus Development, *1-2-3*, *Symphony*
MicroPro, *Chartstar*, *Planstar*
MDBS, *Knowledge Manager*
MicroSoft, *Basic Compiler*, *Basic Interpreter*, *Chart*, *Flight Simulator*, *Project*, *Word*
PC Software of San Diego, *Executive Picture Show*
Prentice-Hall, *ExecuVision*
Schuchardt Software Systems, *Intecole*, *Intemate*, *Interpret*, *Inteplan*, *Inteword*
Softrend, *Aura*
Software Products Int., *Open Access*
Software Publishing, *PFS:Graph*
Sorcim, *SuperCole 3*
Summa Software, *Winning On Wall Street*
Trader's Forecast, *Winning On Wall Street*
Trader's Data Manager
Advanced Ideas, *The Game Show*, *Master Match*, *Tic Tac Show*
CBS Software, *Big Bird's Special Delivery*, *Dinosaur Dig*, *Ernie's Magic Shapes*
Davidson & Associates, *Math Blaster!*, *Word Attack!*
Designware, *The Grammar Examiner*, *Math Maze*, *Language Arts*, *Spellcopter*, *States & Traits*, *Trap-a-zoid*
Developmental Learning Materials, *Alien Addition*, *Alligator Mix*, *Demolition Division*, *Dragon Mix*, *Mesier Multiplication*, *Minus Mission*
Edware, *Algebra 1*, *Algebra 2*, *Algebra 3*, *Algebra 4*, *Algebra 5*
Individual Software, *Professor Pixel*, *The Instructor*, *The Typing Instructor*
Knoware, *Knoware*
Scarborough Systems, *MasterType*, *Songwriter Learning Co.*, *Addition Magic*, *Magic Spell*, *Maplewin Parade*, *Number Stomper*, *Reader Rabbit*
Scholastic, *Turtle Tracks*
Sierra On-Line, *Dragon's Keep*, *Troll's Tale*
Simon & Schuster, *Typing Tutor III*
Spinmaker Software, *Alphabet Zoo*, *Delta Drawing*, *Fraction Fever*, *Hey Diddle Diddle*, *Kids on Keys*, *Kindercomp*, *Rhymes & Riddles*, *Story Machine*



The Paradise Modular Graphics Card runs all the popular programs Hercules does, plus 150 more.

Springboard, *Early Games for Young Children*, *Make a Match*, *Piece of Cake*, *Match Quiz*
Thoroughbred Software, *Exploring the Amazing Food Factory*, *The Fascinating Story of Cell Growth*, *Haw Plants Grow*, *Migrating Molecules*, *Mastering Units of Measurement*, *Photosynthesis*
Unicorn Software, *Funbunch*, *Ships Ahoy*, *Ten Little Robots*
Digital Research, *DR Loga*
Energonics, *Energraphics*
Fox & Geller, *dGraph*, *OZ*
Graphic Communication, *Graphwriter BASIC*, *Graphwriter Combination*, *Graphwriter Extension*
Harvard Associates, *P.C. Loga*
Innovative Software, *Fast Graphs*
Mouse Systems, *PC Paint*
PC Software of San Diego, *PC Crayon*
Peachtree Software, *Business Graphics System*
Arktronics, *Jane*
Eagle Software Publishing, *Personal Financier*
Monogram, *Dollars and Sense*
Penguin Software, *Graphics Magician*
Sierra On-Line, *Homeword*
Adventure Enterprises, *Sea Dragon*
AtariSoft, *Centipede*, *Defender*, *Dig Dug*, *Donkey Kong*, *Pac Man*, *Robotron*, *StarGate*
Avalon Hill Game Company, *Andromeda Conquest*, *Computer Football Strategy*, *Computer Stocks & Bonds*, *V.C.*, *Voyager*

Broderbund Software, *Serpentine*
CBS Software, *Match-Wits*, *Mystery Master: Murder by the Dozen*
Hayden Software, *Sargon III*
Innovative Design Software, *Pool I.S*
Intelligent Statements, *Alyum*
Microlab, *Crisis Mountain*, *Death in the Caribbean*, *Dino Eggs*, *High Rise*, *Minor 2049er*
Muse Software, *Castle Wolfenstein*
Odessa, *Backgammon*, *Checkers*, *Chess*, *Odin*
Origin Systems, *Ultima III*
Orion Software, *J-Bird*
PC Software of San Diego, *Championship Blackjack*
Penguin Software, *The Quest*
Priority Software, *Forbidden Quest*
Scarborough Systems, *Buck Rogers*, *Congo Bongo*, *Star Trek*
Sentiment Software, *Cyborg*
Sierra On-Line, *BC's Quest of Tires*, *Championship Boxing*, *CrossFire*, *Dark Crystal*, *Frogger*, *King's Quest*, *Oil Well*, *Ultima II*, *Ulysses and the Golden Fleece*
Sir Tech, *Wizardry*
Sirius Software, *Buzzard Bait*
Spectrum Holobyte, *Goto*
Spinnaker Software, *Snooper Troops #1*, *Snooper #2*
Sublogic, *"Night Mission"* Pinball

It's true, Hercules only runs 10 of the 161 programs with graphics for the IBM PC carried by SOFTSEL, the largest distributor of micro computer products.

Since the Paradise Modular Graphics card is 100% compatible with the IBM color graphics standard, it'll run virtually every program written for the PC. In monochrome. And in color. Now and in the future.

And we give you a \$50 trade-in allowance on your old Hercules or IBM card.

So see your dealer or call us. And get some good news for a change.

PARADISE
SYSTEMS, INC

PC: Mart

PC SOFTWARE

Public Domain & (User Generated)

- PC-WRITE (word processor)
- PC-FILE III (data base manager)
- PC-CALC (spreadsheet)
- PC-DIAL (modem communications)
- PC-DBMS (relational database) - 192K
- PC-GEN LEDGER (business bookkeeping)
- SUG & FINANCE (66 basic business programs)
- FINANCE MGR (home/office bookkeeping) - 256K
- PC-DESK II (notebook, calendar, alarm, etc)
- PC-DESAVATES (desktop utilities in windows)
- ARCADE GAMES (100+ games, joystick, etc)
- PC-PI GAMES (educational, basic games)
- BASIC GAMES (extended, a-z, word, etc)
- TUTORIAL (Basic - education)

\$8.00
Each

Try a Six-Pac

any size of the above only \$38.00
(incl. orders and \$2.00 shipping & handling)
(limited disk and brochure \$3.00 each)

The above programs were written for the
IBM PC & PC-compatible, will run on some compatibles
on condition of compatibility before ordering

Soft Plus Research
P.O. Box 590
Boonville, CA 95415
(707) 925-2210

9:00 a.m. - 8:00 p.m. M-F (no M-F) (no M-F) (no M-F)
CIRCLE 170 ON READER SERVICE CARD

64K ■ 128K ■ 256K

DRAMS

80287-8 ■ 80287-3

8087-3 ■ 8087-2

8087-1

BITTNER
DE
ELECTRONICS

899 SOUTH COAST HIGHWAY
LAGUNA BEACH, CA 92651
(714) 497-6200
CALL FOR FREE CATALOG

CIRCLE 180 ON READER SERVICE CARD

PERFECT COPIES GUARANTEED

Why risk duplicating your important programs on your computer, when our equipment is designed solely to duplicate disks and verify their perfection 100%?

Over 600 formats. 3 1/2", 5 1/4" and 8". Plus serialization, copy protection, labeling, packaging, shrink-wrapping and fast, personalized service.



**Western
Transdata Inc.**
DISK DUPLICATION

1701 E. Edinger Ave.
Building A7
Santa Ana, California 92705
(714) 547-3383 (Collect)

LOOKING FOR AFFORDABLE HIGH RESOLUTION GRAPHICS

THE DRAWING TABLE

is your answer!

- 640 x 200 high resolution mode
- Library functions
- File operations
- Easy to learn, menu driven
- Technical support
- MS mouse support
- IBM PC, XT, AT, true compatibles

49.95

+\$3 S&H Visa/MC. TN + 7.25%



K SOFTWARE HOUSE
Software, Service, Consulting
Rt. 2 Box 8381
Unionville, TN 37160
(615) 294-5090

CIRCLE 160 ON READER SERVICE CARD

ICs PROMPT DELIVERY!!!

SAME DAY SHIPPING (USUALY)

V20	CPU-4070-080-4	\$16.00
8087-2	Math Coprocessors	140.00
DYNAMIC RAM		
256K	84Kx4 150 ns	\$7.99
256K	256Kx1 120 ns	3.25
256K	256Kx1 150 ns	2.47
128K	128Kx1 120 ns	5.65
64K	16Kx4 150 ns	2.75
64K	64Kx1 150 ns	1.00
EPROM		
27C256	32Kx8 250 ns	\$7.50
27256	32Kx8 250 ns	4.75
27C64	8Kx8 200 ns	3.75
2764	8Kx8 250 ns	2.50
STATIC RAM		
6264LP-15	8Kx8 150 ns	\$2.99



Microprocessors Unlimited Inc.
Factory New, Prime Parts
2400 S. Ninth Ave.
REDDO, OR 97461
(918) 267-4961

Prices shown above are for Nov. 25, 1985.
Prices will vary with market conditions. Please call for current prices.
Prices are for quantities of 1000 or more. Minimum order is 100 units.
Prices are for quantities of 1000 or more. Minimum order is 100 units.
Prices are for quantities of 1000 or more. Minimum order is 100 units.

PC EXPANSIONS

AST SuperPlus (64K)	\$229
SuperPlus (384K)	\$259
MegaPlus (64K)	\$269
Advantage (128K)	\$429
Advantage (15M)	\$569
I/O Plus	\$129
PCnet - starter kit	\$629
Quadboard (84K)	\$183
Quadboard (384K)	\$229
Quadmeg AT (128K)	\$319
Quadmeg AT (2M)	\$379
Quadport AT	\$105
HERCULES graphics board	\$319
Color Card with PF	\$189
HAYES Modems 2400	\$151
Smartmodem 1200	\$409
Smartmodem 1200B	\$609
Set of 8 chips (64K)	\$6
256K chips (each)	\$3
6087 chip	\$119
Maynard Disk Controller	\$100
Sandstar Series	\$341
Internal Hard Disks from	\$609
Maynard Stream tape backup from	\$979
Quime 142A	\$99
Teac F055B	\$109
Tandon TM100-2	\$119
CDC 9409	\$20
Verbatim Casette disks (10)	\$20

VLM Computer Electronics
10 Park Place • Morris Plains, NJ 07960
(201) 267-3268 Visa MC Check or C.O.D.

SPEEDUPS

ZDOOS-PC SUPERCHARGER

The software package that really speeds up your PC! Aside the features IBM forgot, it increases display speed 1.3 to 4X! Recalls data rolled off the top of the screen. Eliminates flicker on IBM color graphics card. Powerful keyboard enhancer with macros makes function keys and scroll lock work with all programs. Transfers screen output to disk. Onscreen clock/timer & more. Pop up menu controls all functions. In handsome IBM binder with complete documentation. \$34.95

8088 TURBO SPEEDUP CHIP

New 8088 turbochip executes instructions 10-30% faster. High speed design maintains total compatibility yet speeds up ALL programs. 5 minute installation - just plug it in. Adds a powerful extended instruction set. Quickly pays for itself in time saved. \$28.95

MBE

PC PERFORMANCE IS OUR ONLY BUSINESS

SPEEDUPS

AT CRYSTAL KIT

Do it right! The most complete kit available to speed up your AT. A set of 4 quality crystals that from 7.0 to 10.0 MHz. Allows you to run at the highest speed possible while still maintaining your AT's reliability. Simple installation. \$29.95

FINALLY: QUICK BOOT ROMS

Tired of waiting forever each time you turn on your PC? Just plug in one of our quick boot ROMS. Your PC will boot as soon as you flip the switch! A must for serious PC users. PC Quickboot \$29.95, XT Quickboot \$49.95 Call today

MBE SYSTEMS

1355 Sunrise Ct.
Los Altos, CA 94022
(415) 947-6100

**Immediate
Shipping!**

**THE PERFORMANCE YOU NEED
AT A PRICE YOU CAN AFFORD**

CIRCLE 160 ON READER SERVICE CARD

REPRINTS AVAILABLE

Quality reprints of articles appearing in PC Magazine are available and will be prepared to meet only special requirements. Inquiries should be directed to Eileen Pfeiffer, Reprints Dept., 20 Davis Publishing Co., 1 Park Ave., New York, New York 10016. Phone 212-503-5447



PC BlueBook

■ ADVERTISING RATES AND INFORMATION:

Standard listings consist of a bold lead line (23 characters maximum); 7 lines of body copy (45 characters per line); 4 lines for company name, address and telephone number. \$300 per insertion—4 issue minimum. Additional charge for extra lines and company logos. Prepayment and frequency discounts available. American Express, MasterCard, Visa accepted. Copy subject to publishers approval. Send typewritten or printed copy, reproducible logo art (if applicable) and remittance to Kathryn Cumberland, Classified Sales Manager, Ziff-Davis Publishing Company, One Park Avenue, New York, NY 10016. For additional information, assistance, or to place an order by phone, call collect (212) 503-5115.

ACCESSORIES FURNITURE

777 UGLY 777

Turn that ugly PC into a beautiful piece of furniture. Solid oak covers for your CPU or monitor handmade by Starbuck Minivan, professional cabinet makers for over 50 years. \$49.95 each or both for \$89.95. Perfect fit for IBM or Compaq computers. Shipping included. Money refunded if not satisfied. Check, MC, Visa.
STARBUCK MINIVAN
606 Santa Barbara St.
Santa Barbara, CA 93105

ACCESSORIES SUPPLIES

2-LINE BUSINESS PHONES

Incredible features include (FCC Approved):
*2-Lines + Hold + Conference (3 party) buttons
*54 Memories, suitable for MC or SP/PRINT
*Hands Free Dialing with Speaker Phone
*Use RJ11C or RJ14C Jacks (Tone or Pulse)
*No need for AC Adapter—Music on Hold
*One year Warranty—Only \$79.00 per set
VOGUE IMPORTS INC.
16123 Valero Street
Van Nuys, CA 91406
(818) 901-0441

KEYTOPS/KEY OVERLAYS

TOUCHDOWN™ full size keyboards enlarge major control keys on IBM & lookalikes, state mode & color talk or IBM grey. \$21.95. TOUCHDOWN™ key overlays available for 5251, 5520, 3270, DISPLAINT 2 & 3, WORD STAR, WORD PERFECT 3.214.0 and most popular software, plus do-it-yourself kits. \$6.95-\$29.95, U.S. orders posted.
MOOLEN COMPANY
Dept. BB, PO Box 201
Corvallis, AZ 86325
(602) 634-7517

IBM STYLE BINDERS, SLIPS

Complete program packaging line. D-ring cloth binders, slide cases, floppy pages, game portfolios, Continuous paper with three large holes, 20 lb. to go in binders. Blank disk envelopes. Function key cards tell user your F1-F10 meanings. Low prices on floppy disks. Call, write for prices. FREE Catalog. Fast service, low prices.
ANTHROPOMORPHIC SYSTEMS LIMITED
376 E. St. Charles Road
Lombard, IL 60148
(312) 629-5180
1-800-DEAL-NOW

LASER PRINTER USERS!

Toner Cartridge Recharge Kit (instructions & one recharge) \$99.00
TONER ONLY (ONE REFILL black) \$20.00
REFILLED CARTRIDGES \$40.00
Call (617) 821-1427 or send orders to:
P.C. Corp. 1030 Turnpike St., Canton, MA 02021
(all orders sent UPS collect if not pre-paid)

BAR CODING

BAR CODE/LABEL PRINTING

THE LABEL MAKER™ prints bar codes, OCR-A like and large characters from data entered at keyboard or from disk files. Create and save unique printing formats and record layouts. Perform record add, change, delete, sort and select on disk files. A1 LABELMAKER™ prints AWG shipping/parts identification labels required by Auto Manufacturers. Programs require IBM PC or work-alike.
TJ SOFTWARE INC.
P.O. Box 2044
Arlington Heights, IL 60005
(312) 364-1055

BAR CODE LABEL PRINTING

PRINTBAR™ is a set of well documented programs written in both MBASIC™ and dBASE™. The programs print Code 3 of 9 barcodes from sample data files on OKidata and Epson compatible printers. In addition, PRINTBAR™ documentation includes how barcodes work and where to get barcode readers. \$149 plus \$7 Shipping and Handling, C.O.D.
Bear Rock Software Company
P.O. Box 212
Placerville, CA 95667
(916) 622-4640

BUSINESS OPPORTUNITIES

MONEY MAKER FOR CONSULTANTS

Law firm management is the key to your share of \$5 billion and specialized software-hardware sales projected by 1990. LTM time and billing software for large and small professional firms has received a published national press review. Use it for your own billing and sell it to attorney's, CPAs, and all others who bill for their time. Dealer discounts on every sale. LTM is consistently chosen over heavily advertised products some costing 10 times its \$495 price. Send for details.
MEGA META, Inc.
6990 Lloyd Place
Los Angeles, California 90069
213-278-5249

COMPUTER/ INSURANCE

SAFENWARE

If your computer is important to you, insure it! SAFENWARE provides full replacement of hardware, media and purchased software. As little as \$39 a year covers fire, theft, power surges, earthquake, water damage and auto accident. Call 8 am to 8 pm Monday thru Friday Saturday 9 am to 5 pm
SAFENWARE, THE INSURANCE AGENCY INC.
2520 N. High Street
Columbus, OH 43202
(614) 262-0559 (OH), (800) 848-3469 (NAT)

COMPUTER REPAIRS

IBM PC/XT/PPC & COMPAQ PORTABLE REPAIR

Circuit boards and electronic sub-assemblies professionally repaired on ATE (Automatic Test Equipment). An alternate solution, with lower pricing and fast turnaround. Dealer & Manufacturer packages available. From keyboard to power supplies. Call
UNTRACE
2188 Del Franco St.
San Jose, CA 95131-1575
(408) 946-1090

COMPUTER SERVICES

CHANGING WORD PROCESSORS?

We convert to and from:
HERCOK PC-DOS
DEC WORDSTAR
IBM MULTIMATE
LAMER SAMMA
WANG ASCII
MICOM
Also most CP/M systems. Call for our low prices. Test conversions available.



Data Conversion, Inc.
8800 Coliseum Blvd., Buena Park, CA 92620

DATA CONVERSION INC.

6310 Caballero Blvd.
Buena Park, CA 92620
(714) 522-7762
(Toll Free (800)—824-4851 in Calif.)

DATA CONVERSION

FULL SPECTRUM

of Data Conversion services
• Quick Turnaround
• Highly Professional
• Most Conversion Scenarios

Computer System Services, Inc.
5 East 16th Street
New York, NY 10003
(212) 242-5255

BLUEBOOK

DON'T REKEY-CONVERT

We use the latest disk, tape, scanning, & telecommunications technology to reformat data for you. QUICKLY AND ACCURATELY USUALLY AT ONE TENTH YOUR CURRENT COST. We transfer data between word processors, typesetters, micros, minis, mainframes, & software packages. We supply a full range of consulting services including Data Customization and Database Development.

Data Conversion Laboratory
67-27 168th Street
Fresh Meadows, N.Y. 11365
718-939-4821

DISKETTE COPY SERVICE

9 TRACK TAPES TO IBM-PC

Convert mailing lists or other main frame data on 1600 BPI 9-track tapes to PC-DOS 5 1/4 diskettes. New automated process guarantees data verification. Easy instructions for loading to your data base (dBase, dBaseIII, etc.) or hard disk. Only \$60 per million chars. \$95 minimum. Bernoulli box \$35/4.

A.S.I. Inc.
1259 El Camino, Suite 260
Menlo Park, CA 94025
(415) 323-6338

HARDWARE ADD-ON ACCESSORY

HYPERION OWNERS

Are you running out of memory? HyperRam—Miniature external plug-in module (4 1/4" x 5 1/4" x .75") increases the memory to 512K or 640K. Now available! \$350/\$450
Technician Research
63 Widdowcombe Hill Blvd. Suite 1103
Winston, Ontario M9R 4B2
(416) 245-1656

HARDWARE ADD-ON BOARDS

IEEE 488 CONTROLLERS

The most respected name in GPIB interfaces for microcomputers offers you two IEEE 488 Controllers for IBM compatible Personal Computers. Ziatech's experience guarantees you the best documentation and most efficient software available. Two-year warranty. Call or write for free information packet.



Ziatech Corporation
3433 Roberto Court
San Luis Obispo, CA 93401 USA
(805) 541-0488/ITT Telex: 4992236

FIXED DISK BIOS/BOOT

FIXT boots from most popular Hard Disks—GAYNE, XENIX, IOMEGA, GT LAKES, etc. Adds XT-like BIOS interface to your disk for PC. Security, multiple volumes, removable media support, optional No-sit plug-in installation. Specially controller and computer with order \$80-\$180 Add \$3 ship, CA tax.



GOLDEN BOW SYSTEMS
P.O. BOX 3039
SAN DIEGO, CA 92103
619/296-9349

SPEED UP YOUR IBM AT

Our speed kit can accelerate your system from its current speed of 6 mhz to 10 mhz (66% increase). (80) test/utility programs included. Easy instructions, non-technical installation. No soldering involved. 99% success rate. From \$10 to \$49.95 Visa-MC-COD. Call about High Speed 80286, 80287 and other AT enhancements. AMS/AT Enterprises
10045 Coddlebury, Ste. A
Rowland Heights, CA 91746
818-810-8443

8 PORT SERIAL I/O

At last a single board for the IBM PC to drive 8 SIO ports. Full RS232 on all ports, synchronous, separate baud rates on each port. Based on the IBM standard INS8250. Make your own stat mux, talk to 8 CRT's from one application program, or connect multiple peripherals. Delivery: 5 to 3 wks. Price: \$275 (quantity 25) Circuit Craft, Incorporated
16802 Oakmont Avenue
Gaithersburg, MD 20877
Phone: (301) 963-3305

HARDWARE COOLING DEVICES

LESS NOISE! MORE COOLING!

Does your PC sound like a high speed turbine? Does it use expansion cards that create extra heat? Solve your noise & cooling problems with the SILENCER from PC Cooling Systems. Each model utilizes a super quiet, West German, all metal, 4 1/2" fan. Model SD cools with 84% less noise than the standard fan it replaces! Model HP provides over 100% more cooling! Mounts to existing holes on the back of the IBM PC or XT. Shipped Shipping: \$79.95 + \$4.50/VISA/MC/CX
PC COOLING SYSTEMS
31510 Via Ararat Dr.
Bonsall, CA 92003
(619) 723-9513

HARDWARE COMMUNICATIONS

CUSTOM PRODUCTS

Creative Communications, Inc., Custom Product Division, offers research, development, and manufacturing capabilities, according to your product specification, budget, and schedule. In most cases, functional prototypes can be completed within 30 days. Call us today to discuss your new product needs.
Creative Communications, Inc.
1662 West 520 North
Provo, Utah 84601
801-373-9843 Tlx. 469241

HARDWARE DISK DRIVES

8 INCH DISKETTE SYSTEM

Read, write, and format diskettes from IBM mainframes, minicomputers, data entry equipment, etc. Complete easy to use software handles EBCDIC conversion. Can read and write CP/M 8-inch diskettes (many formats). You also can use 8-inch drives for PC-DOS files. 1200 KB per diskette \$1150 complete.
MicroTech Experts
644 Emerson St., Suite 6
Palo Alto, CA 94301
415-324-9114

HARDWARE POWER PROTECTION

MERICK STAND-BY-POWER

THE MERICK STANDBY-POWER SYSTEM provides back-up power and protection from power failures, brownouts, surges, spikes, and power line noise. The enclosed battery will supply a long run time during a power failure: 240 watt system—\$365, 400 watt system—\$495, 600 watt system—\$795
MERICK Inc. POWER SYSTEMS DIVISION
Box 296
Frisco, CO 80443
(303) 668-3251

HARDWARE STORAGE DEVICES

COUPLER FOR 9 TRACK TAPES

Two models available to read and write 1/2 inch magnetic tape with formatted 9-track drives. Runs all speeds and densities in PC, XT and AT running MS-DOS or XENIX. Data transfers up to 90,000 bytes per second! Complete with cable and software, prices start at \$880.
OVERLAND DATA, INC.
5644 Kearny Mesa Rd.
San Diego, CA 92111
(619) 571-5555

HARDWARE PERIPHERALS

QUICK BOOT YOUR PC/MI

FOR IBM PC'S ONLY! The PC-IMMATE, a Firmware ROM Module for the IBM-PC! Features: BOOT within 10 SECONDS! BREAK THE 640K BARRIER! Access up to 704K of RAM! (Lotus, DOS, etc.) SCREEN RELIEF - protects your monitor, and MORE! Easy PLUGS IN-NO SLOTT! Special Intro Offer: \$49.95 + \$3.50/Hk. Inquiries accepted. CK/NO/VISA/MC



J.S. & J. SOFTWARE
1281 S. King St., Suite 6A
Honolulu, HI 96814
24 hr Orders: (800) 821-5226 ext. 435

SHARE PC PORTS FOR \$200

SHARE multiple PC's with a printer or a modem NO MORE manual switches or loss of data SHARE a terminal with a modem or a printer NO MORE cable swapping or T-switches. SHARE printers, SHAR, JANCOUSLY with one PC! Call to learn more about expanding your resources—without inflating your budget!



TAMAT
P.O. Box 470300 Suite 1113
Tulsa, OK 74145
(918) 627-0891 or 627-7594

MAILING LISTS

MAILING LISTS

Now over 655,000 micro owners. Select by brand: 219M Apple, 179M IBM PC, 156M TRS-80, 97M Commodore and more! 9 phone verified reseller lists including 6,211 stores. VAR's chain buying offices, Canadian and more! 25,000 Unix users. 14,000 computer companies. Lists by software brand, printer model, modem owners, investors, educational, etc. Over 75 different micro and mini lists. Call or write for FREE catalog. Include phone and name of business you're in.
Irv Brechner
TARGETED MARKETING INC.
Box 5125
Ridgewood NJ 07451
(201) 445-7196

PUBLICATIONS

CATALOGS

ASSEMBLY LANGUAGE A SNAP!

At last a truly readable guide to PC Assembly language programming! Uses the system debugger as I/O device for easy, reliable coding. Covers basic to advanced topics step-by-step. Complete opcodes & instruction sets. Lots of examples and exercises. 407 pages only \$16.95 at bookstores, or send check + \$1.00 S&H to: LITTLE BROWN & CO. PUBLISHERS, 200 West Street, Code MS2069-1, Waltham, MA 02254. 1-800-343-9204.

SECURITY

STILL WAITING? INSECURE?

QUICKON-Instant Turn-on module-\$65.95. LOCKIT-Password Boot-Up module-\$129.95. User selectable PW & Boot-only-from-HD mode. PC RESET-Reboot w/o cycling power-\$21.95. Easy to install. No slot, specially PC/XT/AT. LOCKIT II-PW protection for subdirectories, for DOS 2.0 & up. \$79.95.

MC/VISA SECURITY MICROSYSTEMS CONSULTANTS, 18 Flagg Place, Suite 102 PC, Staten Island, NY 10304. Telephone (718) 667-1019.

TAPE TO DISK CONVERSION

TAPE TO DISK CONVERSION

Convert any 9 track magnetic tape to or from over 500 formats including 31/2", 5 1/4", 8" disk formats and word processors. Formats available include IBM-PC, APPLE, Altos, TRS80, CP/M, Display, IBM SYS/77, Macintosh, Wang, LANIER, OS/6 and 500 more. Disk to disk conversions also avail. Call for more info. PWAR COMPUTING SERVICES, INC., 47 W. Dundee Rd., Wheeling, Illinois 60090. (312) 459-6019.

SOFTWARE

ACCOUNTING

CUSTOM PAYROLL

All systems support multiple pay categories, calculation of all taxes, user-defined deductions, exceptional item handling, a variety of necessary reports, paychecks and W-2 forms. Written in PC Basic with full source included for easy maintenance. Prices start at \$695.00 for basic system and manual. DATASMOOTH, INC., Box 9036, Shawnee Mission, KS 66208. Phone: (913) 381-9118.

PC-FUND

PC-FUND is a fund accounting system for local govts, schools, colleges, and not-for-profit groups. The system includes: General Ledger, Report Writer, PO/Encumbrance, payables, receivables, payroll/personnel, budgeting, utility billing and fixed assets. The system supports up to 99 funds, 9999 departments and up to 36 fiscal periods are on line. PC-FUND runs on the IBM PC and most MS-DOS & XENIX computers. AMERICAN FUNDWARE, INC., PO. Box 773028, Steamboat Springs, Colorado 80477. (303) 879-5770.

CRYSTAL PAYROLL

Fast and easy to use. Computes wages and taxes in seconds. Prints checks with itemized stubs or stubs only (hourly, salary, Ten user defined pay types for hourly, salary, dollar, bonus, commission, tips, and piece rate wages, expenses, and ten voluntary deductions including 401Ks. True multiple pay and deduction rates. Allocation to multi GL accts and cents. Multi company. Ideal for payroll services. Federal, state and local laws with flexible employee options. Quarterly and year-end reports. Standard \$395, Restaurant \$695, Construction \$695, Farm \$695, VISA, MC, AMEX. 30 day money back guarantee. CRYSTAL SOFTWARE, 3100 Broadway, Suite 203, Boulder, Colorado 80302. (303) 443-5528.

G/L ACCOUNTING POWER

Now, the same financial reporting power used by offices of all the "Big B" is available to corporate controllers. AMI's G/LACCOUNTING™ Corporate General Ledger gives complete flexibility for custom reports. Fixed Asset Management and Financial Plan Link to Lotus 1-2-3™ are available too. Nationwide support.



Accountants Microsystems Inc., 3633 136th Place SE, Bellevue, WA 98006. 800-426-8201, 206-643-2050.

CASH CONTROL! FOR \$35

Check Book & ShoeString™ A personal or business CASH CONTROL system. Uses bank & cash transactions to track income, expenses, & CASH FLOW. Prints checks, expands or income summaries by acct, totals. Excellent for tax preparation. Fully menu driven. Requires Lotus 1-2-3/IBM PC or comp. Add S/H. VISA/MC accepted. Audi Electric, 35453 Alagney Court, Fremont, CA 94536. (800) 321-0130. National Orders (415) 791-6994 CA.

CONSTRUCTION ACCOUNTING

The CMAS system is designed for contractors where tracking job costs is required. Modules include: Job Cost, Payroll, A/R, A/P, General Ledger, Estimating, & Service Billing. CMAS software is fully integrated, includes automatic invoicing & ties-in to most spreadsheet & WP programs. Multi-terminals available. DATA-BASICS, INC., 11000 Cedar Road, Suite 110, Cleveland, OH 44106. (216) 721-3400.

GENERAL LEDGER PACKAGE

FINANCE MANAGER II: A personal/small business general ledger system for the IBM PC. Menu driven, easy to use, all major reports, budgets and graphics. We have so much faith in this package we are offering an evaluation copy for only \$7 or a registered copy for \$63. GENESIS SOFTWARE, PO. Box 1607, Colorado Springs, CO 80935-6007. (303) 576-5333 MC/VISA/AMEX.

CYMA ACCOUNTING USERS!

Unleash the number-crunching and data manipulation power of your data base or spreadsheet to further analyze your accounting data. Our system converts your CYMA data to dBase, ASCII, or 1-2-3 worksheet formats to provide a link with dBase, 1-2-3, Wordstar etc. IBM & compat. \$150. Call for details. PROFIT PLUS, 2300 Ridgeway, Sausalito, CA 94965. (415) 331-7567.

SOFTWARE

BUSINESS

TIME ACCOUNTING & BILLING

TABS is designed for use by professionals who bill on the basis of time (attorneys, accountants, etc.) A.B.A. approved. Quick-entry entry and edit. TABS is easy to understand and operate. STI's full feature software is currently in use by over 1400 firms nationwide. PC-DOS, MS-DOS, Hewlett Networks. For details contact:



SOFTWARE TECHNOLOGY, INC., 620 No. 48th, Suite 120, Lincoln, NE 68504. (402) 466-1997.

HardRunner™

Run Lotus without system diskette! This is the authentic HardRunner™ program that allows you to run Lotus and Symphony from your hard disk without the need for a system floppy in the A drive. \$34.95 plus \$5 s&h. For further information, see advertiser index listing for Neotradamus. NOSTRADAMUS, 5320 South 800 East, Salt Lake City, UT 84121. (801) 261-0769.

PROFESSIONAL TIME/BILLING

Handles 400 clients, 20 partners, 80 job (\$40 out of pocket expense) descriptions, 20 areas of practice codes, fixed fee or per hour billings, & more. Prints billings, monthly statements, aged receivables, & more. Free telephone support. \$149 (VISA, M/C, AMEX). Other original software: Cal/Win for FREE CATALOG! MICRO-INT PROGRAMMERS, 173 Birch Avenue, Cayce, CA 95340. (905) 995-2329 (24 hour).

BUSINESS FORMS!

Print your business forms, using information from PPS: FILE IBM Filing APT databases or full screen input. Supports automatic date, time and sequential control. Includes clear forms design overlay. Price: \$140 plus \$5 S&H. VISA/MC/Check. 800/338-7905 Orders only. Virtual Solutions, Inc., P.O. Box 5054, Evanston, IL 60204. 312/328-3981.

CUSTOMER SUPERBASE \$35

This easy to use powerful menu driven customer info system has helped thousands. Find customers in one-two seconds no typing. Unlimited number of records & labels per customer. Full screen editing. Mailing labels by zip or name. Password protection. Full customer lists. Take memos-recall them later & much more! \$35 call.

MAKE LIFE EASY ASK ABOUT SUPER UTILITIES!

PLACE MANAGEMENT CORP.

50-25 65TH PLACE, WOODSIDE, N.Y. 11377. VISA/MC (718) 651-6700.

BILLING/INVOICES

MANAGEMENT MADE SOFTWARE SERIES-BILLING™ was designed with simplicity in mind. Professionals, retailers, and manufacturers, prepare bills or invoices the way you already know how. Produces a professional bill/invoice, daily and monthly summaries, aging reports, monthly statements and more. Does not use time or inventory. \$195 + \$5 s/h \$35 demo disk. DEPLAINTING/CAROLANUS, 22 South Clinton Street, Doylestown, PA 18901. (215) 343-4771 (215) 345-0433.

BLUEBOOK

LP88—LINEAR PROGRAMMING

A powerful menu-driven system for solving linear programs with up to 255 constraints and 255 variables. A new product from version 8.00 solves problems up to 510-2510. Features include interactive and batch operation, spreadsheet-style input and editing, a storage system for problems and bases, sequential file input/output. Simplex algorithm restart, a complete report generator, sensitivity analysis. Requires 150K 8088 with 8087 support, user's guide. VISA/INC.
EASTERN SOFTWARE PRODUCTS, INC.
POB 15328
Alexandria, VA 22309
(703) 549-5469

TPR088— TRANSPORTATION ROUTE

A powerful interactive system for finding routes on transportation networks. Networks may have up to 512 nodes and 32768 links. Includes procedures for finding the shortest path between two points, sequencing of up to 50 stops, finds minimum spanning tree, time or distance between all points. Menu-driven, graphics display, & features similar to LP88. Req. 150K, color graphics. 8088 w/8087 support, users guide, U.S. road network. VISA/INC.
EASTERN SOFTWARE PRODUCTS, INC.
POB 15328
Alexandria, VA 22309
(703) 549-5469

QUERY FACILITY/REPORT WRITER

"qPLEX IV" reads "any file formats" (COBOL, BASIC, dBASE, dBase, ASCII, etc.) Lets you select/omit "any primary" (your own special forms, reports, labels, bar graphs) or query. Export your existing data to spreadsheets and word processors. No programming required. Dealer demo available. DOS, Xenix, Unix, Snow Software Corporation
3330 Fisher Road
Clearwater, FL 33519
(813) 784-8999

dBASE II/III SOFTWARE

GENERAL LEDGER (integrates w/ dINVOICER)	\$99
dINVOICER (Billing & A/R)	\$99
SALES ANALYSIS (Works with dINVOICER)	\$99
JOB COSTING (for Contractors)	\$99
JOB ESTIMATING (Works with Job Costing)	\$99

SOURCE CODE included for dBASE II or III. Require printer, 2 360K Floppies or Hard Disk.
DATAMAR SYSTEMS—(619) 223-3344
1152 Albion St.
San Diego, CA 92106
Master Card-VISA-Check-CCD

SOFTWARE

BUSINESS PROJECT MANAGEMENT

AHA! (408) 458-9119

You found it! The number to call for software to manage any complex project, e.g.: R & D, CONSTRUCTION, BUSINESS/VENTURE PLANNING! Demo Sampler-Pack includes PMS-II, RMS-II, MMS-PII, HARVARD TOTAL PROJECT MANAGER, HORNET, PERT-MASTER, TIME-LINE, SORCUM SUPER PROJECT PLUS! Our staff of Project Managers and Microcomputer professionals provide NEEDS ASSESSMENT, SET-UP, TRAINING, INDIVIDUAL CONSULTATION by management!

aha!

AHA! INC. PO. Box 8405
Santa Cruz, CA 95061-8405 (408) 458-9119
Project Management SERVICES

MicroPERT® 1

Multi-project scheduling for IBM PC, XT, AT & true compatibles. Timescaled Network Diagram, Gantt chart & Cost/Resource histogram on screen or printer. 8 standard reports. Up to 220 subprojects. DF output. Extensive manual. 1 Year limited warranty. Call/write for brochure. Price: \$350.00 (demo \$25.00)
Sheppard Software Company
4750-P Clough Creek Road
Redding, California 96002
Phone: (916) 222-1553

SCHEDULE GRAPHICS™

Prints custom bar and milestone schedules from Lotus 1-2-3/Symphony input. Features many graphic symbols for representing activity durations and milestones. Easily place text with symbols. Many other features for creating effective schedules. Requires PC/MS-DOS and dot matrix printer. \$59.00—specify printer: (CA. res. add 6%)
SUCCESS SOFTWARE
14252 Curver Drive Suite 448
Irvine, CA 92714
(714) 551-6224

SOFTWARE

COMMUNICATIONS

COMPUTER-TELEX-LINK

Link your computer to telex with Cawthon's Computer-Telex-Link. Available for US and overseas applications, Cawthon's Telex-Link is easy to use, has on-line help, self-test diagnostics, frequently called numbers, a complete User's guide, and excellent support. For many computers and operating systems.



**Cawthon
Scientific
Group**

24224 Michigan Avenue
Dearborn, Michigan 48124
Phone: 313-565-4000

WANT FREE SOFTWARE?

Bulletin boards have it. VOR-TALK puts it on your disk! Can pay for itself in 10 minutes! On-Line Help, Windowed Menu, Split-Screen viewing/transfer on two port system, Dozens of emulations & MUCH MORE! FAST! FRIENDLY! & POWERFUL! For IBM & Compatible w/150K, async & DOS 2.00 & up. Perfect for business! Only \$195 Visa & MC (Ohio Residents Add 6%)
VOR-TECH Corp.
104 6th Ave. (Chiusi)
Miamisburg, Ohio 45342

SOFTWARE

DEVELOPMENT TOOLS

DEVELOPMENT SOLUTIONS

Use your PC as a complete development system. Cross-assemblers target most popular chip families. Debug with 16/32M full-screen software simulators and TRICE in-circuit emulators. Turn your code into firmware with superfast AYPROM EPROM programmers. Available for CP/M-80, CP/M-86, PC/DOS/MSDOS host systems. Priced from \$200. Call for details.

**AVOCET
SYSTEMS INC.**

Avocet Systems Inc.
PO Box 490-G
Rockport, ME 04856
(800) 448-8500, (207) 236-9055

dBASE DEVELOPMENT SYSTEM

Professional Development System for dBase II & III w/12mb of source, utilities, & programs for quick & creative application development. \$195 dBase programmers editor w/library manager windows let you edit up to 4 command files on screen, complete w/powerful source development features. \$245.
GLOBAL TECHNOLOGIES CORP.
16572 E. Louisiana Drive
Aurora, CO 80017
(303) 337-7758

SOFTWARE

DATA ENTRY

SIOES/PC

Replace your 029, 129, 3741, 3742, 5280, etc. Versions: Extended keychain to comprehensive, full function for high volume, heavy editing. Features include standard keyboard + verify, table lookup, search, insert/delete, format change, select, balance, statistics & much more. Prices start at \$195—30 day free trial.
Software Telesharing Service, Inc.
8830 Fourwinds Drive, Suite 231
San Antonio, TX 78239
(512) 656-6484

RODE/PC DATA ENTRY SYSTEM

RODE/PC is unmatched for power & ease-of-use. Menu-driven, pop-up help, heads-down speed, extensive input validation, automatic reformatting, conditional processing; operator status; 029 keyboard option, much more. \$40.00. \$595 for first license. \$395 each additional Volume discounts.
DPX INC.
20823 Stevens Creek Blvd., C-1C
Cupertino, CA 95014
(408) 973-9252 TELEX 701111

ENTRYPOINT

Most widely installed data entry system for PC/XT/AT! Heads-down speed, sophisticated multi-screen applications. Features: paint the screen form design, data validation, table & file lock-ups. Help keys, logic processing, reformatting, batch totals, verification. 129 KB mapping & more. Demo \$24. Operator \$545 Developer \$845. Volume pricing.
DATALEX
650 5th Street
San Francisco, CA 94107
(415) 541-0780, (800) 962-8888

BLUEBOOK

SOFTWARE

DATA MANAGEMENT

PC-FILE III™

Easily to use, and one of the most powerful. All standard features (search, sort, list) plus, browse, global changes, macros, mailing labels, formatted reports with selection and calculations, subtotals, totals, averages, encryption. Exchange data with 1-2-3, WORD, WordStar, etc. Over 100,000 users. Version 4.0 \$59.95 + \$5 s/h. Check, M/C or VISA. Toll free 24 hrs: 1-800-JBUTTON. ButtonWare, Inc. P.O. Box 5786 Bellevue, WA 98006 (206) 746-4296

PC-FILE/IR™

Next generation offspring of PC-File III. All the power of its popular predecessor plus: Relational capabilities, integrated letter writing and mail merge, context sensitive help windows "pop up". New binary search retrieves data hundreds of times faster. Ask your dealer for it, or order direct from ButtonWare. \$149.95 + \$5 s/h. Check, M/C or VISA. Toll free 24 hrs: 1-800-JBUTTON. ButtonWare, Inc. P.O. Box 5786 Bellevue, WA 98006 (206) 746-4296

SOFTWARE

DATA TRANSMISSION

TRANSFER/1-2-3®

Easily transfer your selected data direct from your PC files into Lotus or Symphony. Handles numeric or alpha ASCII data. Has automatic spreadsheet creation & reusable file definitions. Order now & get free copy Function Key Loader utility. PC/XT, DOS 2.x. Only \$9.95 + 2.50 s/h. Call or add 6% tax. MC/VISA, Am Exp, company check. SOFTMARK P.O. Box 17085, San Diego, CA 92117 Order: 619/280-2077 (CA), 800/858-0692

FIRMWARE PRODUCTION ON PC

LINKLOCATE enables PC users to produce ROM-based firmware for 8086/57/186 from object files generated by C, PLM compilers & MASM. Provides full control of segments placement anywhere in memory. Supports output of intel hex file for PROM programmer, absolute object file for symbolic debugger & ICE, and MS-DOS EXE file. Includes an intel, compatible linker, loader, librarian and hex formatters. \$250. Systems & Software, Inc. 3303 Harbor Blvd., C11 Costa Mesa, CA 92626 (714) 241-8630

TURBOPOWER UTILITIES

Nine Powerful tools for Turbo Pascal users on PC/XT/AT & compatibles—Pretty Printer, Structure Analyzer, Execution Timer & Profiler, Pattern Replacer, File Differencer, Command Repeater & more. See ads in Byte & PC Tech or call 408-376-3672 for more info. DOS/3.0 & 140 pg printed manual. \$55. With source code & theory. \$95. Order toll-free at (US) 800-538-8157 x830, (CA) 800-672-3470 x830.



TurboPower Software
478 W. Hamilton Ave., # 196
Campbell, CA 95008

SOFTWARE

EDIT

LIU Jake

So Long EDWIN Hello LIU! Jake! A Command-Fire Full screen Editor for IBM PCs and compatibles. A productivity tool for data entry and modification of text files. Fast and functional for the DP professional. Easy to learn for the novice. Comprehensive on-line help facility. \$49.95 + \$5/h. Fooks Mathewson Company P.O. Box 2424 (Dyer-24) Arlington, Virginia 22202 (703) 684-6204

SOFTWARE

EDUCATIONAL

ABC STATISTICAL SOFTWARE

Basic statistics for the IBM PC and compatibles in an interactive, easy-to-use format. Includes data entry system and file utilities. Processes to 200 variables, unlimited cases (must fit on one disk). Reads ASCII SPSS data. \$200 (\$100 non-profit). Demo \$30. Outside US add \$15. Corsairium Software P.O. Box 4250-A15R, 429 Thompson St. Ann Arbor, Michigan 48106-1246

UTILIZE THIS SPACE!

Consult PC. Blue Book every issue for easy reference to services/hardware/software. You can be part of PC. Blue Book for 4 issues for only \$1,000. You get 7 lines of copy, PLUS a boldface heading, PLUS 4 lines for your name, address, and phone number. Loop at \$540 additional. Reach out to the largest market of IBM PC owners and users TODAY. Call Kathryn Cumberlander collect today! PC BLUE BOOK 1 Park Avenue New York, NY 10016 (212) 503-5115 collect.

SOFTWARE

ENGINEERING

ENG/SCI GRAPHICS

OMNIPLOT(S) (screen graphics) & OMNIPLOT (P) (plotter driver) provide integrated engineering/scientific 2-D & 3-D graphics with NO PROGRAMMING REQUIRED! Menu-driven, flexible, professional. Choice of formats: tabular/line, contour, bar, pie, 3-D wire frame & much more! OMNIPLOT(S) \$195, OMNIPLOT(P) \$195. Both \$255. MICROCOMPATIBLES 301 Prelude Drive Silver Spring, MD 20901 (301) 993-0683

NEW STRUCTURAL DESIGN

Fast, efficient, versatile structural analysis and design program in spreadsheet format—BEAMS, COLUMNS and FRAMES of any material. Friendly input and output with data storage and COLOR graphics. Specify PC, XT or AT and send \$25 for demonstration diskette to: C-Squared B-Squared Software Design Inc. 763 27th Ave. San Francisco, CA 94121 (415) 751-1337, (800) 621-0851

SIMULATION

GPSS is a full-power version of GPSS, the most popular man/machine simulation language. More than just a language, it is a simulation environment specifically designed for interactive use on today's high-speed microprocessors. Using GPSS/PC, you can predict effects of changes to real-world systems. MINUTEMAN SOFTWARE P.O. Box 171/R Shaw, MA 01775 1-(800) 343-0954 ext. 4800 (U.S.) 1-(800) 232-1238 ext. 4800 (Mass. only)

ATLAS Tutor &

ATLAS Tutor is a menu-driven training tool to help engineers learn to generate ATLAS code. ATLAS Syntax Verifier is a development tool to make you more productive off-station. The verifier is menu-driven and runs in an interactive or a Batch Mode. Both are in accordance with IEEE Standard-716. Price: \$400 each or \$550 for both. Requires 192K for the tutor and 256K for the verifier. DOS 2.0 or later, and two disk drives. DUBERT International, Inc. 8658 Glenhaven St. San Diego, CA 92123 (619) 277-4700

BEAM ANALYSIS & SPRING DESIGN

Beam Analysis Prog. calculates shear moments, reactions, slopes and deflections in beams. Price: \$50.00 Helical Spring Design Prog. for compression, extension and torsion springs. Price: \$75.00. Both packages include disk and documentation. For IBM PC, PCjr & compatibles & for Apple II series of computers. 48K required. SYLCA CORP. 33-47 14th Street Long Island City, NY 11106

CREATE PCB'S EASILY

Easily create double-sided printed circuit board artwork of up to 21" square using PC-Layout on an IBM-PC. The artwork is created using a color artwork editor. The final artwork, solder mask and silk-screen (text) is produced using either a printer or a plotter. Price \$745. Demo Disk/Manual \$45. DRACD TECHNOLOGY 7210 Jordan Ave., Suite 050 Crenshaw Park, CA 91303 (800) 235-6646 ext. 548 (outside CA) (800) 235-6647 ext. 546 (CA only)

ENG/SCI GRAPHICS PLUS

GRDS software system for managing 2D data on IBM or Rainbow PCs (PRO score). Contouring, gridding, interpolation, Fourier transforms (no power of 2 req). Large data sets. Screen, printer and plotter support. GRID operations in space and frequency domains. Useful for geoscientists, engineers, surveyors. \$400.00. Machine Algorithms 1515 - 9th Street Boulder, CO 80502 (303) 442-1072

V-BELT DRIVE DESIGN

This program will design a V-Belt drive for you. Selects standard components for user defined input. Can also specify non-standard components and build your own constraints into system. Selects between 3V, 5V and 8V sections. Calculates most efficient configuration. \$49.95 (\$2 s/h) MC/VISA INTEGRATED DATA TECHNOLOGIES, INC. 4775 Bunchberry Lane Colorado Springs, CO 80917 ORDERS: 303-468-2593

SOFTWARE

ENTERTAINMENT

STAR FLEET I

"I call STAR FLEET I the world's most elaborate star battles game"—Jerry Rounelle, Byte Sept. '84. Features full color, music, promotions. Capture ships, lay mines, launch probes, rescue beacons, repair damage, eliminate intruders, more! 96 pg. manual. Req. 128K PC/PCjr, 1 drive, 80 cols. \$49.95 + \$2 s/h. Also for TI PC, SANYO ME 555 (192K), C-64, ATARI. CRYGUS For CC orders: P.O. Box 57825 (800) 622-4070 Webster, TX 77596 (800) 942-7317 (713) 466-4163 (in Illinois)

COMPUTER TRIVIA

Over 1950 questions covering TV, Sports, Movies, Presidents, Science, Literature, Music and Geography. Entire game is in the computer—no books, no gameboard, no spelling required. One or two players. Requires 80-character CRT screen (Mono or Color). Send \$29.95 c/m. Dealer inquiries welcome. WMA ENTERPRISES P.O. Box 454 Scotch Plains, NJ 07076 (201) 232-5968

BLUEBOOK

PYLON RACER FLIGHT SIMULATOR
Pylon Racer. Thrills & challenges of racing air-
planed color graphics. See your opponent drawn
in perspective on screen. Race against yourself
or a friend using flight data saved on disk. Op-
tional: use 1200 baud modems to race a friend
in real time! Demo disk: \$5.00. Pylon Racer:
\$44.95 + \$2.00 s/h. VISA/MC.



Mind Systems Corp.,
P.O. Box 506
Northampton, MA 01061
(413) 595-6463

LOS ANGELES ON A DISK

A test and graphics adventure game with a touch
of reality. Explore the city while looking for the
location of hidden prizes. Includes instructions
on how to program in your own city. A thought-
provoking adult game for one or two players.
Great Hunt Req. 128K, PC/XT, color graphics
adapter, \$39.95
Klymax Engineering
P.O. Box 1066
Sierra Valley, CA 95062
(805) 563-1029

CRYPTOGRAM SOLVER

Full featured cryptogram program including built
in editor, disk save/load, printer output, help
functions. Unique "create your own" feature. 62
page manual. Sample puzzles included. \$29.95
+ \$2.00 shipping. GA residents add 4% sales
tax.

PEDEMONT SPECIALTY SOFTWARE
P.O. Box 6637
Macon, GA 31208

TRAIN DISPATCHER

TRAIN DISPATCHER is a realistic simulation of
a railroad traffic control center. It was created by
designers of CTC systems for operating rail-
roads and is used by some railroads in their dis-
patcher training programs. Available for IBM PC,
XT, AT and J for \$35.00 + \$2.50 s/h. Graphics
card required.
SIGNAL COMPUTER CONSULTANTS, LTD.
P.O. Box 18222, Dept. 33
Pittsburgh, PA 15236
(412) 675-1727

SOFTWARE/

FILE CONVERSION

ASCII TO PPS: FILE

PPS/FILE (IBM Filing Assistant) users. Don't relay!
Convert information from ASCII files in a "row and
column" (fixed field) format directly into your
database. Easy-to-use, pop-up window cross-
reference, fast. Price: \$140 plus \$5 S&H. VISA/
MC/CHECK.
800/338-7905 Orders only.
Vertical Solutions, Inc.,
P.O. Box 5051, Evanston, IL 60204
312/328-3961

SOFTWARE/ GAMES

3 GAMES FOR MONOCHROME

VOYAGE TO THE BASE and **101 MAZES** chal-
lenge your address: devious predicaments and
hazards, amazing graphics and sound effects.
LET'S PLAY BRIDGE offers 65000 contract deals
for novice and intermediate levels. You bid & play
against computer. IBM PC or equiv., 64 K one
drive. \$17 each pp or send for free data.
Techno/Culture Associates
809 Gary Avenue
Somerville, CA 94066
(408) 732-1940

PC/VEGAS GAMBLING GAMES

Poker, Blackjack, Roulette, Keno, Slots. Each
Vegas odds includes accurate odds to explain
your best bets and odds; help windows, cross-
game scoring. Graphics not mandatory. Written
in C (PC/AT) Req. 128K. PC/VEGAS—\$15. Source:
Games Inc (904)—\$39. An excellent way to learn
C & H BEAR SOFTWARE
Box 10733
Marina Del Rey, CA 90295
(213) 374-0356

SOFTWARE GENERAL

SHOP CHEAP—EAT SMART

***COUPONOMIZER**—Save more money with your
discount coupons and rebates. \$4K.
***DIET ANALYZER**—Lose those extra pounds!
Tracks calories + 23 nutrients. Ideal for menu
planning. 128 K. Immediate shipment, 2 week
money back trial. \$49.95 ea. + \$2.50 s/h. AmEx,
MC, VISA. Call for free brochure.
NATURAL SOFTWARE LTD.
7 Lake St., STE 7E
White Plains, NY 10603
(800) 626-2511, (914) 761-9329 in NY (collect)

9.95 SOFTWARE

PRNFILE converts files for LOTUS import
CHECK personal check writing program
PURGE eliminates duplicate records
LOG document logging and retrieval
FORTTRAN subroutine library (w/date & time)
many other programs, call for free catalog or send
\$9.95 (program - \$2 shipping to)
9.95 Software
6300 Hilsdorf, Suite 304
Houston, Texas 77081
(713) 271-1060

\$7.00 ... INCLUDING DISK

- * **IBMPC Light Pen** c/w software: \$70
- * **64K RAM** (set of 9) 150ns NEC 4146: \$10
- * **384K Multi-Function Card** c/w FULL RAM: \$180
- * **BARGAINS FOR HARDWARE/ACCESSORIES SOFTWARE:**
- * **2,500+ Titles for IBMPC** from \$7 APPLE - \$7
- * **LOTS OF DOCUMENTATIONS, VOLUME DISCOUNTS**

State your computer. Each huge catalog: \$1.00
MICRO-WORLD, Dept PC1
Tower P.O. Box 310
Singapore 1232
Republic of Singapore

DINE BY DISKETTE

Computerized restaurant guide of Manhattan
reveals the hot favorites of Wall Street's money
makers and other NY glitterati. Cross-matches
by location, type of cuisine, and price range. Add
your own favorites to the system. No yuppie
should be without it. IBM PC & compat: \$18.95
+ CT tax. Visa/MC, Check.
DIGITAL/DINC
Box 54
Southport, CT 06490
(212) 362-2006

SOFTWARE GEOGRAPHICAL

US-ATLAS

Locates 29,000 cities, with graphic display of
states. Computes Great-Circle distances. Finds
all states with cities of the same name. Locates
all towns within a given radius. Shows towns 5
mi. either side of a line 40 mi. long. Color graphics
or monochrome. IBM-PC/XT/AT 192K DOS
2.0. Send \$39.95 money order or check.



ILLSTON PC-PROGRAMS
1930 Hayslett Dr.
Jefferson City, MO 65101
(314) 635-3417

SOFTWARE GRAPHICS

35mm SLIDE FROM YOUR PC

COMPUTER SLIDE EXPRESS converts graphic
files produced on the IBM PC into brilliant 35mm
color slides with color resolution 400% better
than your monitor. Leave your printouts behind.
Use high resolution color slides at your next pre-
sentation. **COMPUTER SLIDE EXPRESS** \$6/slide.
\$30 minimum order.
VISUAL HORIZONS
180 Metro Park
Rochester, NY 14623
(716) 424-5300

EXECUTIVE PICTURE SHOW

Stop! Before you take an expensive look at Gra-
fix Partner, PC Paint, Excel/View, or any other
graphics package, shouldn't you take a look at
the free-form drawing/presentation graphics
packages that do more? Give us a call or write
us for information about Executive Picture Show
and PCcopying. \$15 Trial Versions available.



EXECUTIVE PICTURE SHOW

PCSOFTWARE
9120 Gramercy Dr., Ste 416
San Diego, CA 92123
(619) 571-0981

FORTTRAN/PASCAL GRAPHICS

GRAPHATIC (screen-graphics): 70 Microsoft/IBM
2.0 FORTRAN/PASCAL, RM-PROF, OR, SS
FORTRAN callable subroutines. Prof. graphics
power backed up by a 100 pg user manual. 5
packs in one gen utility. 2-D interactive, total 2-
0 plot support, 3-D plots, 3-D solid models
(hidden line removal). \$135 H-P/H-Plotter? Try
PILOTNATIC for complete plotter graphics ca-
pabilities. Interface w/GRAPHATIC. \$135. Both
\$240.

MICROCOMPATIBLES
301 Prelude Drive
Silver Spring, MD 20901
(301) 593-0663

GRAPHIC PRINTER SUPPORT

At last IBM-PC graphics support for your dot
matrix printer. Use the PrintSe key to produce
quality B&W or color scaled dot matrix repro-
ductions of your display on your Epson, IBM,
Okidata, IDS, Centronics, DEC, Anah, Data-
south, Gemini, TI 850, Riterman, Toshiba, NEC
8023, or C. Ith printers. If your printer is not
listed, let us know and we will support it. All
GRAPHICUS is now available for all versions of
PC or MS-DOS and will operate with IBM, Tech-
nic, and Hercules graphics boards. \$49.95.
JEWELL TECHNODOES, INC.
4302 Southview Alaska St. Suite 207
Seattle, Washington 98115
(206) 307-1081, 1-800-628-2828 ext. 527

INTERACTIVE FLOWCHARTER

Interactive EasyFlow a full screen graphics pro-
gram for flow & organization charts. Very pow-
erful. 3 levels of zoom, automatic line routing,
automatic text centering, horizontal & vertical
scrolling, 18 std shapes, user defined shapes
easily added, full manual. Requires 256K and
graphics adapter \$149.95.
Howe/View Software Limited
P.O. Box 1093-F
Thousand Island Park, N.Y. 12692
(613) 542-7270 Ext. 50

SOFTWARE

HEALTH

CompuMedic™

PROVEN Practice Management System—In use 4 yrs. Patient data management, A/R, statements, insurance forms, practice analysis, word processing, recall, delinquent tracking, historical data. FLEXIBLE: User designed forms/reports \$3600. Training X/T/AT Dental (DentalWare™) eyecare/optometry (EYEMate™), and veterinary (VetLogic/Int) also available. Dealer inquiries invited. DATA STRATEGIES, INC. 332 S. Juniper St., Suite 210 Escondido, CA 92025 (619) 489-9218

SOFTWARE

HOBBIES

FAMILY TREE™

Record your family history without forgetting the family budget. Trace 10 generations of ancestors or pet pedigrees. Record baby, ann and other family info. Totally menu driven. Requires IBM PC or comp., 1 floppy disk, printer, 128K, DOS 2.1 or later. \$59.95+\$3 shipping—VISA, MC or check.



SYSTEMS CONSULTANTS, INC.
P.O. Box 37076
Raleigh, NC 27627
800-334-0854 Ext. 508 NC-819-846-1753

THE RECIPE MANAGER

Organize and retrieve your recipes easily and quickly. 65,000 recipes/database. Serving size adjustment with units of measure conversion. Generates shopping lists. Creates hard copy cookbook. Fast searching and retrieval. 115 mcg included. Manual with tutorial and index. Runs on 128K PC or up to \$49.95 CNY/MC only. GEM ISLAND SOFTWARE P.O. Box 393 Reading, MA 01867-0693 (617) 944-1382

SOFTWARE

INTEGRATION

BACKBONE™

Give your PC/AT/AT BACKBONE! Customize sets of linked menus with a Menu Processor™. Access any program, batch file, or submenu with a keystroke. Provides sophistication, structure, and a simple user interface. Ideal hard disk or organizer. Supports multiple users. Compact, fast. \$39.95 - \$44 s/h. MC/VISA. SYNCHRONY SYSTEMS 4191 San Juan Ave., Jacksonville, FL 32210 ORDERS: 800/237-6360 ext. 314, 800/282-1152 ext. 314 (FLA)

SOFTWARE

INVESTMENT

QUANTITATIVE INVESTMENT SOFTWARE™

5 quantitative valuation models, cash flow analysis, diversification index, what-if testing, security search, tax planning and total portfolio accounting. 9 client presentable reports. Single or multiple portfolio management. IBM/PC, AT, XT, and compatibles. \$295.00. Meisler card/VISA. QUANT IX SOFTWARE 5900 N. Port Rd., 146-APC Milwaukee, WI 53217 (414) 951-1891

SOFTWARE

LANGUAGES

BETTERBASIC

- Structured language with BASIC Syntax
 - Extensible—Create your own keywords
 - Modular—Procedures can be grouped together into library modules for higher productivity
 - Utilized full PC memory capacity (640K)
 - Full support for graphics, communications, and screen formatting. \$159, \$367 module \$99.
- Reflex System \$250, sample \$10
Summit Software Technology, Inc.
P.O. Box 99 Babylon Park
Westley, MA 02157
(617) 235-0729, 1-800-225-5800

SOFTWARE

MAILING PROGRAMS

MY-T-MAILER™ \$30

Our users love this sturdy menu-driven worker. Secretaries say "terrific!" Print labels, 3x5 cards, envelopes, any format. Customize labels with line-by-line printer fonts. Sort, Search & Select with powerful, flexible, easy user-interface. EZ Browse, Edit, & Delete. Print up to 5000 copies of one label. Also PCjr! Req. 128K, \$30. JOHN HENSON SOFTWARE COMPANY P.O. Box 16507 Dept. 3 Seattle, WA 98116 (206) 305-4861

The Quick Mailer

Fast, flexible, menu-driven program designed for organization, club and business mailouts. Easy to insert, update, and delete entries. Use individual or continuous envelopes or labels any size you request. Also, option for storing telephone numbers for easy recall and printing. Works on graphic (various print styles) or letter quality printer. Sorts by zip or name. \$27.95 J.P. Enterprises P.O. Box 200771 Austin, Texas 78720-0771 (512) 331-1038

SUPER MAIL™ \$25

This easy to use, powerful menu driven program is used by thousands of happy customers. Find names in 1-2 sec. No sorting. Features unlimited records & labels per name AND full screen editing. Select labels by zip or name. Password protection is available. Take memos-recall them later + more! Only \$25.00 VISA/MC. PLACE MANAGEMENT CORP. 50-25 65TH PLACE WOODSIDE, NEW YORK 11377 (718) 651-6700

FLOWMAIL™—\$100

Add, update, delete records. Create/Name separate files. Merge files. Eliminate duplicates. Sort by company name, last name or zip code. List a file in report format. Written in basic Menu & prompt driven. Very fast and easy to use. Free file conversion and customizing available. Call or Write TODAY! for more info



FLOWSOFT CUSTOM PROGRAMMING
675 Franklin Road #1835
Marinetta, GA 30057
(404) 433-3590

SOFTWARE

MANUFACTURING

MYTE MYKE™ MANUFACTURING Control System

Integrates with Business System. Std cost provides Bill of Material, operations routing, where used, same as except & projection capabilities for Central, Forecast/Sched, MRP, MRP, Prod Cost, Prod Orders, Shop Floor Control, Install & support avail. PC/DOS, MSDOS, NOVELL Networks, XENIX & UNIX. M & O SYSTEMS, INC. 3885 N. Buffalo Rd P.O. Box 108 Orchard Park, NY 14127 (716) 662-6611

MCBA MANUFACTURING SYSTEM

Designed to be flexible for use in job shop or repetitive environment. Over 15,000 users. Inventory Management Bill of Materials, Order Processing, Purchasing, Job Costing, Shop Floor Control, MRP, Product Costing and Routing, Labor Performance, Accounting, MDS-DOS, XENIX, UNIX. Dealer inquiries accepted. Source available. MOM SYSTEMS INC. P.O. Box 792 Southfield, MI 48037-0792 (313) 535-0200

SOFTWARE

MEDIA

AUTOMATIC CONSULT LETTERS

Easy-to-use program stores 20K, Rts, plus 2000 bytes text on over 12,000 patients. Data printed as consult letter using any of thirty customized letter templates. Names/addresses of referring doctors stored too. Vastly speeds office paperwork and invaluable aid to clinical research. \$199 U.S. plus shipping. CMS Software Inc. 4500 Sherbrooke St. West Westmont, Que., Canada (514) 995-1006

SOFTWARE

MEDICAL

DIFFERENTIAL DIAGNOSIS

The INTERNIST runs differential diagnoses on any combination of 480 symptoms for 331 diseases. Lists symptoms associated with any disease. Prints & displays diagnoses in rank order. Extremely easy to use and fast. Includes binder, user-manual program & data base databases. \$95.00 VISA MC/check or UPS COD accepted. N-Squared Computing 5318 Forest Ridge Rd. Silverton, OR 97361 (503) 873-5886

THE BEST FOR LESS!

Enjoy the benefits of the most comprehensive software available for doctors using IBM and compatible computers for a fraction of what others charge. NOT JUST INSURANCE FORMS AND ACCOUNTS RECEIVABLE, but superbills, referral and insurance tracking, scheduling, recall, PROBLEM ORIENTED MEDICAL RECORDS and more for up to 5 providers. The price: only \$969. Why so much for so little? It was designed by a practicing physician who believes the profession should have the best available tools. It has been proven in offices like yours for over 4 years. Ask about our 30 day return privilege and full telephone support. DRUG/ASSISTANT, BY MedSoft, simply better at any price. Can you afford not to try it? WESTWARE 6992 El Camino Real, Ste. 104-345 Carlsbad, CA 92008 (619) 753-0299

BLUEBOOK

PSYCHOLOGIST'S BILLING SYSTEM

PSYCHIATRIST'S BILLING SYSTEM

Flexible, powerful, flexible, easy to learn & use. Try it and see! Print PT STATEMENTS & INS FORMS automatically or in batches. Enter your own fee schedule and diagnoses. GROUP or SOLO use. Custom report formatting included. IBM & compatible \$550 Apple \$495
FREE DEMO DISK & PROGRAM DESCRIPTION
Teller, Bailey Associates, Inc.
P.O. Box 7240, Dept P
Boulder, CO 80306
(303) 258-7250

SOFTWARE

MUTUAL FUNDS

FUNDGRAF®

Graph & find best performing mutual funds or stocks with IBM PC, PCjr, & compatibles. 128K. GRAPH PRICE and/or MOVING AVERAGE (any span). Superimpose graphs for comparison. Calculate relative strength RATINGS. Generate buy & sell SIGNALS when trend changes. FREE info DEMO disk \$10. FUNDGRAF disk \$100. MC/VISA. Parsons Software, Dept. 0
118 Woodshire Drive
Parkersburg, WV 26101
(304) 424-5191

SOFTWARE

MULTI/USER SYSTEMS

MULTIPLE USERS UNDER PC-DOS

Get four workstations for the price of one PC by using MultiLink Advanced™ in combination with PC-DOS and inexpensive dumb terminals. Using serial ports instead of KiloByte network interface boards, the system transforms a single PC, XT, or AT into the CPU of a multi-tasking, multi-user network. Includes print spooler, keyboard enhancer, & SBS software.



THE SOFTWARE LINK, INCORPORATED
8601 Dunwoody Place, Suite 632
Atlanta, GA 30338
CALL: 404/998-0700

SOFTWARE

PERSONAL

MEDICAL EXPERT SYSTEM

Sophisticated acute abdominal pain program developed by MD & PhD scientists to assist you & your family in diagnosis of 21 primary medical & surgical conditions based on your symptoms. Be an informed patient. Interesting & unique health care system. \$150 complete with extensive clinical documentation. IBM/PC+ comp.
MathMedics
7315 Granite Road
Melrose Park, PA 19126
(215) 635-6620 or 5820

SOFTWARE

PREVENTATIVE MAINTENANCE

MAINTENANCE & INSPECTION

An easy-to-use computerized method to organize, operate, and control an effective preventive maintenance system. Applicable to any type of business or industry. Full screen input and displays, plus function key help command. Maintains historical data, creates work orders, and provides numerous reports. For info, write to:
PENGUIN COMPUTER CONSULTANTS
P.O. Box 20485
San Jose, CA 95160
(408) 997-7703

SOFTWARE

PROCUREMENT

EXPERT CHOICE™

Use EXPERT CHOICE to make better procurement decisions. Includes many criteria as required such as: cost, corporate image, delivery time, service level and resources. YOU make the judgments and EXPERT CHOICE will integrate them for logical and verifiable procurement decisions. \$495. DEMO DISK \$10.



Decision Support Systems, Inc.
1300 Vincent place—Dept. P
McLean, Virginia 22101
(800) 368-2022 (703) 442-7900

SOFTWARE

REAL ESTATE

EZ-RE INVESTOR TEMPLATES

Complete analysis package for the Real Estate Investor. For Equity Share, Rent House, Apartments, Warehouses, and Office Buildings. Five mortgages can be ARM, FHA245, amort, deferred int. or int. only. Ten year projection of cash flow, deductions, self price, tax at sell, gain or loss per year, and after tax IRR. Expenses, int. rate, and appreciation adjust annually. Also 46 year loan amortization templates. Profit report. Requires LOTUS 123 and 256K. \$50 PPD. Money back guarantee. Visa, MC.
LB ASSOCIATES, INC.
8817 Siskie Lane
Vienna, VA 22180
(703) 938-9093

PROPERTY MANAGEMENT

Comprehensive program for managing residential and commercial properties. Many management reports including operating statement, delinquent rent, lease expiration and transaction register report. Provides check writing, check reconciliation, posting of late fees, recurring expenses—\$395. Investment Analysis—\$245.
Yardi Systems
3324 State St., Suite "O"
Santa Barbara, CA 93105
805-687-4245

PROPERTY MANAGEMENT PLUS

A new easy-to-use system for single or multi-family properties. Prints, checks, rent statements and receipts. Reports—late rents, expired leases, vacancies, income/expenses, and operating statement. Includes a bank reconciliation feature and graphics capabilities! Up to 70% reduction in management time. \$775.
REALTY SOFTWARE COMPANY
1926 South Pacific Coast Hwy #229
Redondo Beach, CA 90277
(213) 372-9419

MONEY TOOLS™

Money Tools™ is a comprehensive set of easy to use, menu driven REAL ESTATE and FINANCIAL PLANNING programs for personal or business use. \$150.00 for complete package. \$15.00 (applicable to purchase of full system) for DEMO-PAC™ and FREE Quick-Calc-Loans™ program. Brochure on request. Requires PC or PC-compatible with PC/MOS DOS 2+, 128K & DS/DD drive.
VANTAGE SOFTWARE, INC.
4626 Blue Jay Avenue
Orange, CA 92669

SOFTWARE

RELIGION

THE SCRIPTURE SCANNER

THE Bible encoded on 7 disks. Create reference files of your favorite Bible subjects. Create lesson plans and study guides. Use "Windows" for comparative study of text on screen. It's complete. It's innovative, it's useful. Try a Demo for \$15.00. Three popular Bible versions available. \$249.95 to \$274.95.
OMEGA SOFTWARE, INC.
P.O. Box 355
Round Rock, TX 78660-0355
(512) 255-9569

SOFTWARE

SECURITY

SECURE AT/XT/PC

Control system access, data access! FXT/S. Control system boot for most popular XT/PC hard disk controllers. Vasture for AT and XT-compatible 40 controllers segments hard disk by volumes, controls access with passwords, supports hard disk expansion. \$80-\$130 + \$3 ship. plus CA tax.



GOLDEN BOW SYSTEMS

P.O. Box 3039
SAN DIEGO, CA 92103
619-298-8348

PASSWORD CONTROL YOUR PC'S

PC LOCK allows file password and encryption protection. With the lock in place, your computer will not boot without entering a correct PW. Ideal for small multi-user environments. A 5" x 4" card with diskette, 16 changeable passwords. Three versions from \$149. DES optional. KEEP YOUR PC STRICTLY PERSONAL.



MPPI, LTD.
2200 Lehigh Rd.
Glenview, IL 60025
(312) 968-8401

ADVANCED COPY PROTECTION

The world's leading software manufacturers depend on Softguard copy protection systems. Now Softguard introduces the SUPERLOK KIT—a complete software duplication and copy protection system for your IBM PC. SUPERLOK protection stops all copywriters, features full HARD DISK support, requires no special media, no source code charges, and supports over 30 compatible FREE demo diskettes available.



Softguard Systems, Inc.
2840 San Tomas Express, Suite 201
Santa Clara, CA 95051
(408) 970-5240

XT DATA SECURITY SYSTEM

MagLock secures any type of file and restricts their use to authorized persons. Using IBM XT or PC with expansion chassis, or any other IBM compatible hard disk system. Secures files, directories, subdirectories or an entire 10 megabyte drive, in minutes, without hardware or operating system modifications. Allows unlimited password selection. Price \$89.00



FLUNDER SOFTWARE LABORATORIES
169 Burnside
Tarrytown, New York 14150
(914) 693-6584

BITLOCK® SECURITY

Proven effectiveness of powerful multilevel security on IBM PC/XT/AT Compatibles, TRS-80, Apple & Commodore computers using rapid decryption algorithms. Total transparency after easy attachment of small reliable security device to external port. Inexpensive, yet has survived piracy attempts > 3½ years. MICROCOMPUTER APPLICATIONS

7805 S. Windermere Circle
Littleton, CO 80120
(303) 798-7663 or 922-6410

SOFTWARE

SPREADSHEETS

PC-CALC™

This spreadsheet has it all at a popular price. 64 columns x 256 rows, math and stat. functions, horizontal bar graphs, line plotting, individually adjustable column widths, F. THEN, link to other spreadsheets or PC-File databases, much more. Version 3.0 requires 256K PC. \$59.95 + s/h. Check, M/C or VISA. Toll free 24 hrs: 1-800-BUTTON ButtonWare, Inc. P.O. Box 5786 Bellevue, WA 98006 (206) 786-1296

SOFTWARE STATISTICS

SIGSTAT

SIGSTAT includes over 70 programs of the IBM statistical series, plus many advanced new features. Mainframe capacity (up to 80 var) for uni- (e.g., ANOVA, regression) + multivariate (e.g., canonical, factor) analyses, time-series, multidim scaling, cross-tab, plots, q/c and more. 6087 support opt. 256K, DOS, \$395. SIGNIFICANT STATISTICS 3338 N. Canyon Road Provo, UT 84604 (801) 377-4860

RATS Statistical Package

RATS brings powerful and inexpensive statistical and econometric computing to the PC. It is a fast, accurate package that performs regression analysis, time-series forecasting, including Box-Jenkins; and cross-section analysis, including logit and probit. RATS can read data in many forms, including Lotus WK5 files. RATS also offers programming features that provide maximum flexibility and power. Spectral analysis and graphics are available as options. Requires 256-K RAM, IBM or compatible. Base program: \$200. Demo including 300 page manual: \$40. M/C, VISA.

VAR Economics
134 Prospect Ave. S.
Minneapolis, MN 55419
(612) 622-9690

\$79—STATISTICAL SYSTEM

Menu-driven. Includes multiple regression; ANOVA (bway, repeated measures, covariance); Nonparametrics; discriminant, factor, 1-tests. Forecasting, Cross tabs, plots. Much more. NCSS-79
865 East 400 North
Keyville, UT 84037
(801) 546-0445

SOFTWARE TAXES

TURBO TAX™

"Very easy to use. Documentation—Excellent!" —PC Magazine. Powerful and FAST! 33 forms plus multiples 3 seconds to calculate including all cross references. Pop-up menus. IRS approved. 1986 tax rates and planning module included. Many extras. Professional version adds 7 forms, built-in database, batch output, client letter, time/ billing and more. Simply the best at any price! Personal—\$65 Professional—\$155. Integrated state returns for most states—\$30! \$100. CheckSoft, Inc. 5674 Honors San Diego, CA 92122 (619) 453-8722

TAXAIDE

PERSONAL: 1040, 1040A, 2106(2), 2441, 5695, 1, A, B, G, R, L, W, RS worksheets. Prints IRS submittable forms except 1040 & 1040A. \$29.95. PLUS—above plus 2119, 3468, 3600, 3603, 4562(3), 6251, Q-1, or F. SE(2). Prints IRS submittable forms incl. 1040 & 1040A. \$59.95. Reg. 1-2-3, 1-4 or later. 182K. Prints IRS. Software Applications of Wichita 2204 Winstead Circle Wichita, KS 67226 (316) 684-0324

INFO-TAX™ 85

Professional, menu driven, tax preparation & planning software. 52 integrated forms, Scheds, Worksheets, FASTEST TAX PACKAGE AVAILABLE Tax Planner. Use overlays, preprinted, or computer generated IRS approved forms. Integrated DC/LL/MD/NI/PA/VA modules. \$250. INDIVIDUAL Ver only \$65. DEMO \$10. AMEX/VISA/MC. Reg. 256K. CRS, Inc. 5712 Magic Mountain Drive Rosville, MD 20852 (800) 622-4070, (800) 942-7317 in IL.

IBM PC LOTUS TAX TEMPLATES

1985 1-2-3/Symphony Tax Templates. Option 1: 1040, A-E, G, R, SE, W, 2106, 2441, 3468, 4562, 5695, 2568/364K; Option 2: Above plus F, 2119, 3603, 4136, 4684, 4835, 4952, 4972, 6251; 320K/448K, \$25. Professional: 32 forms incl all above. 384K/512K. \$50. IRS. Suite M. VISA/MC. SIRON-TAX 13445 SW CRENSHAW DR. TIGARD, OR 97224 (503) 655-2743

TAX PREPARATION

Fully interactive menu driven program prepares 1985 Federal tax returns. Fast, easy to use, lists IRS forms incl. 1040, sch A-G, R, SE, W; forms 2106, 2119, 2210, 2441, 3468, 3600, 3603, 4562, 4797, 4835, 4952, 4972, 5695, 6251. Prints official or subs. forms. MS-PC-DOS 128K. Prof. \$149.00; Personal \$39.95; VISA/MC (RS 54K) CUMPHRY SYSTEMS, INC. P.O. Box 308, Weymouth, MA 01985-0308 617-459-2345, orders 800-622-4070/1, 800-942-7317

SOFTWARE

TERMINAL EMULATION

MicroGate BSC EMULATION

Our MicroGate family offers complete BSC emulation. MicroGate/MS provides both remote 3270 & RJE links. MicroGate II is a programmable BSC subsystem to COROL, C, BSC, etc.; MicroGate 2780/2780 is now the standard to which other PC RJE links are compared all come with our unequalled customer support. GATEWAY MICROSYSTEMS 9501 Capital of Texas Highway, Suite 105 Austin, TX 78759 512-345-7791

VT 100 on PC's, XT, AT.

25TERM-XT 100 Smart Terminal Emulator 132 columns by windowing—no add'l. hardware. Double High/Double Wide Characters. Complete VT 100 line graphics & Smooth scroll. Full keyboard software/MACROS. International Font Support. EGA Support. File transfers: ASCII, XMODEM, KERMIT. Rates to 384K. High throughput. \$150.00. Quarterly, dealer discounts available. 30 day money back guarantee. NEC/You accepted.



KEA SYSTEMS LTD.

4412-2150 W Broadway Vancouver, BC, Canada V6K 4L9 Support (804) 732-7411 TL 404-352848 VCR Toll Free Order Line (800) 663-6702

BARR/HASP INTELLIGENT IJIE

WORKSTATION

Bundled hardware and software for IBM PC, XT and AT. Transmits data to host and receives output simultaneously. Emulates IBM 3277-2 and HASP on IBM 360/20. Line speed 1200 to 18000 Baud (56 KB on AT). Supports multiple high-speed printers beyond 2400 gpm (7000 gpm on AT). Features: menu-driven, printer forms control, plotter support, unattended operation, easy installation. \$950 complete. BARR SYSTEMS, INC. Suite M, 2830 NW 41st Street Gainesville, FL 32606 (800)-BARR-SYS/(904) 371-3050

TC-LINK 3270 & 5251

A full line of remote 3270 & 5251 Emulators available. All developed and manufactured by Trisystems. The Emulators can be used on all IBM PC's in single or cluster configurations. Features: Multiple Host and printer sessions, Hot Key, File Transfer, Multiple LU's, SNA, X.25 & BSC/NIC. Prices from \$699.00 TRISYSTEMS 74 Northdown Blvd. Nashua, NH 03062 (603) 883-0556

SOFTWARE

TRAINING

YOUR KEYBOARD GOTCHA?

Don't miss the benefits of Donak another day. Sure Stroke/Donak gives you sophisticated keyboard translator for DOS applications, supports Donak typing Coach, self-motivation audio cassette, transfer letters, keylog software manual. \$95.00 plus \$4.00 shipping. VISA/MC, AMEX, check. You can stroke the Donak today! Seasoned Systems, Inc. Box 3720 Chapel Hill, NC 27515 (800) 334-5531 (919) 732-9391

SOFTWARE TYPESETTING

HIGH-TECH TYPESETTING

Transmit your text via toll-free lines directly to our fully automated typesetting system. \$2 per K characters with a \$5. minimum. Same day service. 200 typesizes in sizes up to 72 point. Send \$15. + \$3. shipping for our 220 page guidebook, or call toll free and use your MC, VISA or AMEX.

INTERGRAPHICS INC.
106A South Columbus Street
Alexandria, VA 22314
(800) 368-3342 or (703) 683-9414 in DC area

SOFTWARE UTILITIES

SMARTWARE International, Inc., introduces:

- **DISK MANAGEMENT FACILITY (DMF)** including:
 - **FILE SUPPORT FACILITY (FSF)**
 - Cosmetically appealing display of up to 24 files at a time;
 - Single character entries to perform the following:
 - Erase multiple files (up to 24 at a time);
 - Unerase multiple files (up to 24 at a time) previously erased with this facility;
 - Erase a complete directory of files and/or disk;
 - Change file attributes;
 - Type ASCII files to the screen;
 - Select a directory for display;
 - Browse files with update capability-view ASCII & HEX data (including hidden & system files);
 - Dump viewed files to print w/range selection in an easy to read functional format;
 - Run EXE, COM & BAT files;
 - Execute DOS commands;
 - Rename, move or copy up to 14 files at a time, placing each in a different subdirectory or drive if desired;
 - An extremely functional tool for users and technical personnel alike.
 - A true value \$49.95 (for both facilities) or priced separately at \$39.95 each.

MC/VISA
SMARTWARE International, Inc.
759 Avery Street
South Windsor, CT 06070
(203) 646-2616

CO-RES PRINTER UTILITY

Printer Features: Co-resident, uses 8 k, issues printer set-up commands for dot matrix printers from keyboard. Pop-up menu selection. Sends file level, form feed, compressed print etc. with one keystroke. Up to 40 commands. Supports most printers. Not copy protected. Visay/MC No COD's. \$19.95 + \$2.00 S/H.

T.A.G.
(805) 569-2269
3463 State St. #342
Santa Barbara, CA 93105

SCREEN MANAGEMENT SYSTEMS

SMS is simply the best utility available for designing, using, and saving color/monochrome screens. GDS's are supplied in BASIC to input, output, and edit screen data fields. Loads of extra features. We have been in business 15 years, winning many awards for programming excellence. Price \$195, demo \$50. Manual \$10. VISA/MC. PC/XT/PS/54K/1 Disk. DNA SYSTEMS, INC.
P.O. Box 1424
Saginaw MI 48605
(517) 793-0185

COPY IT PC

Copy It PC is the backup insurance you need to protect your software investment. Copy It PC makes floppy backups of most protected software quickly & easily, and even allows several to be run from a hard disk without a floppy in A! (Call for current list.) For IBM PC, XT, AT, 256K or. Also available for Apple II, Mac, C64. \$39.95 + \$3 s/h VISA/MC/Check.

*Central Point
Software*
ENTERPRISES

CENTRAL POINT SOFTWARE, INC.
9700 SW Capitol Hwy., #100B
Portland, OR 97219
(503) 244-5782

PEEK'S 'N' POKES . . . and more!

Thousands of programmers enter their programs and save time with PEEK'S 'N' POKES! The disk (56 program) & manual show you how to access and modify system status, perform DOS & BIOS function calls from BASIC or Pascal, and much more for only \$30. Want more? A perfect companion package, THE INSIDE TRACK, gives your programs assembly-assisted speed plus control over the keyboard, memory, programs, etc. Disk (61 programs) & manual for just \$45. Shipping \$2.50/under MC/VISA.
DATA BASE DESIGNS
14 Bonnie Lane
Atlanta, GA 30308
(404) 256-3860 (800) 722-7006

Hard Disk DIRECT ACCESS™

THE ULTIMATE utility for any hard disk use. DIRECT ACCESS is a powerful hard disk management tool. Organizes your software programs into a "user defined" menu system. Features attractive screen display, rapid access into an application using a single keystroke & easy to learn. Also handles batch files & complicated DOS commands. Order today. Only \$59.95 + \$5.00 shipping. MC/VISA.



DELTA TECHNOLOGY

DELTA TECHNOLOGY INTERNATIONAL, INC.
PO Box 1104
Eau Claire, WI 54702
(715) 832-0958

SCROLL AND RECALL

A resident screen and keyboard enhancement utility. It captures the data that goes off the top of your display screen and allows you to scroll back through this data or save it to a disk file. Also saves your DOS commands as you enter them and allows you to recall, edit and re-enter previous commands without retyping. \$69.
OPT-TECH DATA PROCESSING
P.O. BOX 678
Zephyr Cove, NV 89448
(702) 586-3737

AT/XT/PC HARD DISK EXPANSION

Replace hard disk with a bigger one, or add a second drive! Virtually supports high-capacity drives on standard AT, XT, and compatible hard disk controllers. Includes multiple volumes, security features, selectable clusters, keyboard lock. \$80-\$120 + \$3 shipping + CA tax.



GOLDEN BOW SYSTEMS
PO BOX 3030
SAN DIEGO, CA 92103
619/296-9349

HP LaserJet Setup Utility

SETHP a simple menu-driven and/or batch utility that allows full control over your HP LaserJet printer. Supports 7 font cartridges. Control margins, number of copies, lines per inch, lines per page, etc. Over 125 commands. Only \$49.95 + \$4 S/H. CHECK/VISA/MC. Now NETWORK compatible.

Orbit
enterprises, inc.

ORBIT ENTERPRISES INC.
PO Box 2875-M
Glen Ellyn, IL 60138
(312) 469-3405

dBASE MULTI-USER UTILITY

dNetwork is a program that locks and unlocks both records and files for dBASE III/II to create a pseudo multi-user environment. The locking commands are in dBASE source code and are written into the program. Complete with diskette and technical HELP manual. Only \$99.95 + \$4.95 S/H.

MARKET LINE INTERNATIONAL, INC.
One Essex Street
Hackensack, NJ 07601
(201) 646-0225

PROGRAM POWER!

Write better programs with Complete Super Utilities™ by PWC. Macros, windows, backups, recover files, find files test, hide, encrypt & decrypt files. Password & copy protection, DOS commands for base, graphs & much more! Over 75 programs + our fantastic manual for only \$89. Call for all the details. VISA/MC
PLACE MANAGEMENT CORP.
50-25 65th Place
Woodside, NY 11377
(718) 651-6700

COPY PROTECTION BY MSO

The ULTIMATE diskette copy protection system designed for software developers and publishers. All IBM PC and XT environments are supported which includes DOS, BASIC (compiled and interpreted) Pascal P-System, dBASE II and stand-alone systems. Customized systems available. Requires 54K, two disk drives.
MICRO SOFTWARE DEVELOPERS, INC.
214th West Main St.
St. Charles, IL 60174
(312) 377-5151

DOS PATH COMMAND for DATA

Now Lotus, dBase, Wordstar, etc. can access data files no matter where they're located. DPATH works like DOS PATH command-up to 128 dirs. can be searched. Handles output files, file aliasing and virtual disk box. Wildcards OK. Transfer. Requires only 4K. MS-DOS 2/3. \$49.95 + \$3 s/h MD. add 5% VISA/MC/P/Check.
Personal Business Solutions
PO Box 757 Dept. B
Frederick, MD 21701
(301) 865-3376

ORIGICON EDIT PACKAGE

Create/edit/print text using full IBM char set. Create special fonts with new symbols. Great for foreign languages, forms creations and preparations. View on screen as printed. Simple editing functions. 6 fonts included, or create your own. Epson (or compatible) printer, 128K. \$49.95 (P+ \$6%).
Digital Concepts, Inc.
POB 8345 Dept. B
Pittsburgh, PA 15216
(412) 823-8314

DOS-HELPER ONLY — \$29

ON-LINE HELP system that eliminates most references to the DOS manual. • Both standard & MEMORY RESIDENT versions included • Complete, clear info for all DOS & Debug commands & most topics in the manual • Easily add YOUR OWN help files • For PC, XT, AT & comp. 2.00 & up • 30 day MONEY BACK GUARANTEE! • \$29 + \$3 S/H. CA, VISA, MC.
ARISTO SOFTWARE
16611 El Camino Real #213
Houston, TX 77058
800-3ARISTO, 713-480-6288

BLUEBOOK

WINDOWING FOR "dBASE III"

"dWINDOW" is a unique utility program [BX] that dramatically enhances the screen presentation of "dBASE" by patching itself into memory and adding a series of new commands and functions to the dBASE repertoire. Using these commands, the user can quickly and easily develop menu-driven programs, create on-line look-ups, or simply spruce up their "dBASE" menu and data entry screens. "dWINDOW" is a program that is absolutely magic and dazzling, not to mention down right fun", says Data Based Advisor. Requires DOS version 2.0 or above and IBM, PC, XT, AT or compatible. Cost \$99.00 plus shipping.

LIBERTY BELL SOFTWARE

Liberty Bell Publishing
618 N.W. Gilson, Suite 203
Portland, Oregon 97209
Toll Free: 800-547-3000 (Dept. 606)

IBM USES CP/M DISKS!

"The best CP/M to DOS converter" PC mag, 4/85. Uniform transfers files, formats, reads and writes DIRECTLY to 100+ CP/M disk formats on your IBM PC, XT, AT (also 96 TP1 & 8). Uses normal DOS commands. Next day shipping. Dealers invited. Uniform by Micro Solutions. \$59.95 + \$3 S&H. MC/VISA, check, C.O.D. no P.O.
Blue Heron
1106 S. Second St.
DeKalb, Illinois 60115
(815) 758-2355

EASY AIM-30 trial

Installs your programs on a hard disk and creates subdirectories, paths, and displays programs in a menu, all automatically. Features include time log, backup to floppy or tape, copy files to/from floppies to/from between menu selected directories. DOS is transparent to and user Powerful yet simple \$84.95.
LARSON SYSTEMS, INC.
Box 183
STORY CITY, IOWA 50248
(515) 713-2717

RE/Call™

The best macro-processor for PCs. Make pop-up menus to list/control macros inside any program. Unique and essential compact and step mode - like 123. Only editor that never truncates macros or becomes unavailable. "Stick. Enticing features" - Pop Dmpt. "Excellent. Easy to use/learn" - Business Soft. "Unique step mode" - Tech Journal. "Natural and intuitive" - PC Products. "deserves a home in every PC" - PC Week. US\$69.95. 30 day money back guarantee. VISA/MC/COD



YES SOFTWARE INC.
380-10991 Shellbridge Way
Richmond, BC, Canada V6X 3C6
(604) 270-4152

TOSHIBA-IBM COMPATIBILITY

F351, P1340, P1351, P1350 Printers. Now make your Toshiba printer totally compatible with the IBM (and compatibles) in both text and graphics modes. IOT's IBM-Toshiba Printer Interface has Epson emulating Toshiba quality Screen dumps, IBM upper ASCII chars, font design. Downloadable font capability for P1340 and P1350. \$79.95 (\$2.50 S&H) MC/VISA
INTEGRATED DATA TECHNOLOGIES, INC.
4775 Bunchberry Lane
Colorado Springs, CO 80917
ORDERS: 303-488-2583

POWERFUL FILE MANAGEMENT

IOT's FileManager™ - for people serious about their systems. No kid stuff - only powerful managing tools. File sort, copy, move, delete, search and change attributes. Undelete and Clear files. EOLN enhancer, batch mode cleanup and much more. Menu driven. We offer more features than the best sellers for less money. \$34.95 (about 1/2 Norton's) (2.00 S&H) MC/VISA
INTEGRATED DATA TECHNOLOGIES, INC.
4775 Bunchberry Lane
Colorado Springs, CO 80917
ORDERS: 303-488-2583

PADLOCK/PADLOCK II DISKS

PADLOCK furnishes the user with a method for providing protection against unauthorized duplication from DOS commands \$99. PADLOCK II disks come preformatted with finger-print and serializations. PADLOCK II disks offer superior protection. Ask about our PRIVATE TALK product. All work with hard disk, EKE/COM files and all DOS versions. MC/VISA
GLENCO ENGINEERING
3920 Ridge Ave.
Arlington Hts. IL 60004
(312) 392-2492

PRINTERWINDOW™

Printer utilities for IBM PC & Compatibles.
•Pop-up, memory resident printer control.
•Epson & IBM printer emulation.
•Multi-size screen dumps, test formatting.
•Font editor, Wordstar installation & more.
Packages available for NEC, QTX, OKIDATA, EPSON and other popular dot matrix printers. Info & demo disks available. \$49. VISA/MC-accepted.
Courtin Enterprises, Inc.
P.O. Box 231190
San Diego, CA 92123
(619) 569-8308

SOFTWARE

WORD PROCESSING

PC-WRITE™ TRY IT \$10

Fast, friendly, flexible. Features: mail merge, index, table/contents, footnotes, keyboard macros, windows. Help screen, manual, quick ref card. Try disk with manual and software \$10. Register for support, updates, and newsletters \$75. Shareware: legal to copy and share with others. VISA/mc.
Quicksoft
219 First North #224e
Seattle, WA 98109
(206) 282-0452

WORD FINDER™ IMPROVE YOUR WRITING BY FINDING THE PERFECT WORD FAST!

An electronic thesaurus, Word Finder allows users an instant view of synonyms in a pop-up window (RAM resident, like Slidepak) for immediate word replacement with a simple keyboard. Contains 10,000 synonyms for 3,000 words. You may change word processors as many times as required, from any of the following: Word Star 3.0 to 3.31, Microsoft 2000, Multimate, Word Perfect, PtsWrite, Microsoft Word, IBM Writing Assistant and Easy Writer II, more to follow. Compatible with IBM PC and compatibles and CP/M based computers. Order today at our introductory price of \$79.95 and save a bundle off the regular price of \$124.95.



WRITING CONSULTANTS

300 Main St. Suite 438
E. Rochester, NY 14445
1-800-826-6293
(716) 377-0130 (in New York State)

PC-TYPE™

The easy-to-learn, easy-to-use word processor. Written entirely in Assembler, it's fast, compact, & capable. Help panels, hands-on tutorial program, macros, multiple line headings & look-ups, DOS path support, print spooling, back operations, much more. Use ASCII files. Install program allows customization. \$59.95 + \$5 s/h. Check, M/C, or VISA. Toll free 24 hrs: 1-800-SHUTTON.
ButterWare, Inc.
P.O. Box 5786
Bellevue, WA 98006
(206) 746-4296

ESCRIBE EN ESPAÑOL

Escriben, the first Spanish spelling checker, works with DOS, CP/M and most word processors. Features as in best English checkers but designed for Spanish. Includes on-line verb conjugation. Orders ONLY with VISA/MC: 1-800-536-8157 (in CA 1-800-672-3470). Ext. 806. 99.95 plus 12/65; demo 14.95.
Ibersoft Inc.
P.O. Box 3455
Trenton, NJ 08619
609-890-1496

WORD IMAGE

Edit 4 files, undo, sub-directories, big files, macros, on-screen attributes, command driven, batch files, search/replace in ranges, on-line help, most printers, indexed manual with tutorial, task, MORE. Needs 320K, PC/DOS 2.0+ and 1 DSD0 drive. Intro: \$50. 30-day trial.
SOFTWARE DEVELOPMENT
P.O. Box 305
Brooklyn, NY 11234
718-236-3876

CHECK YOUR SPELLING AS YOU TYPE!

The Resident Speller™ sounds the bell when you type an incorrect word. Works with most word processors. Turn on or off checking and add words to an alternate list with the touch of a key. Requires 50K. In addition to word of processor with 49,000 word dictionary.
The Resident Speller™, \$99. demo disk, \$2.
S&K TECHNOLOGY INC. DEPT D
4610 Spotted Oak Woods
San Antonio, TX 78249
(512) 492-3384



REPRINTS AVAILABLE

Quantity reprints of articles appearing in A+ Magazine are available and will be prepared to meet only special requirements. Inquiries should be directed to Ellen Pfeiffer, Reprints Dept., Ziff-Davis Publishing Co., 1 Park Ave., New York, New York 10016. Phone 212-503-5447.

A+



GET FREE INFORMATION!

Of all the products advertised in this issue of PC Magazine, there are dozens you'd probably like to know more about. Handfuls you might be interested in buying.

Now you can have pertinent, comprehensive information about these products right at your fingertips, and it won't cost you anything. Only a minute of your time.

The manufacturers and distributors of these products have colorful and informative literature available. If you're interested in receiving these brochures, PC's Reader Service Program can help.

Simply follow the instructions described below and PC will forward your requests for information to the appropriate advertisers. Before you know it, you'll have a complete and handy product reference file.

While you are looking through PC Magazine take advantage of this handy flip-open card to circle the numbers as you see products that interest you.

Getting free information about products advertised or mentioned in this issue of PC is as easy as 1-2-3.

1. Each ad in the magazine includes a reader service number. (These numbers are repeated on the advertiser index, as well.) If you'd like more information about the product or products described in a particular ad or feature, circle the corresponding number on the attached card.
2. Fill in your name and address in the space provided. Please: only one card per person.
3. Mail the card today... It's postage paid. And watch your information file begin to grow.

NOTE: This card is to be used for product information or subscriptions only. Editorial inquiries should be directed to PC Magazine, One Park Avenue, New York, NY 10006.

Now is also an ideal time to become a PC subscriber. See the back of this card for details about our special offer for new subscribers.



**IF YOU ARE A
PROFESSIONAL PC
USER...**

**IF YOU SEE THE
PC AS AN INVESTMENT
OR IMPORTANT
BUSINESS TOOL...**

**IF YOU WANT TO
MAXIMIZE YOUR PC
PRODUCTIVITY...**

**HERE IS A SPECIAL
OFFER YOU WON'T WANT
TO MISS!**

Now you can receive one year (22 issues) of PC Magazine for only \$22.00—save 66% off the single copy price!

The money PC will help you save will cover the cost of your subscription more than ten times over!

How?

In PC Magazine, you'll find in-depth and thorough product reviews that will help you make informed and appropriate buying decisions.

You'll learn about innovative applications...project management, communications and graphics...and how to put them to use on your PC.

You'll hear industry news first-hand, and how forward-thinking professionals are using their PCs to further their business goals.

What's more, you get all this information every two weeks, giving you a decided edge over colleagues who rely on a monthly publication.

Your subscription to PC is your guarantee of the most up-to-date and comprehensive coverage of innovations and applications that will help you maximize the performance of your PC.

So don't miss out. Act now on PC's special offer and get one year (22 issues) for only \$22.00. Fill out the attached reader service card and check the subscription box. Or, call toll free, 1-800-852-5200.



PreCursor™ Makes The Hard Disk Easy.



Only
\$69.00

10 DAY MONEY BACK GUARANTEE

PreCursor™ is an amazingly compact and sophisticated indexing system for your hard disk. It runs just ahead of your other applications and makes some very user-friendly arrangements. And at a very businesslike price.

Without PreCursor™, it takes a whole manual of commands to find and execute programs from your hard disk. In a business setting, where novice users must access your system, this is aggravating and expensive.

Tailoring PreCursor™ to your system is an easy operation. On-line help is available at the touch of a function key. A triple level of password protection is built right in. You don't need to know paths or subdirectories or other complicated syntax. You can even change the color of PreCursor™.

After PreCursor™ is setup on your hard disk, it greets you each time the machine is turned on with a list of available programs. You can make simple index choices of even the most complex DOS commands. And set up your printer with the speed and ease of an old pro.

If you're a sophisticated user, you'll love the convenience of full interaction with batch files, passable parameters and user prompts. Home users will appreciate the sure ease of operation.

If you depend on your hard disk for businesslike performance, you can rely on PreCursor™ for instant access.

Thanks to PreCursor™, The Hard Disk isn't so hard anymore.
CIRCLE 198 ON READER SERVICE CARD

Dealer Inquiries Welcome
PreCursor™ will run on IBM compatible MS-DOS systems.
IBM is a registered trademark of International Business Machines Corporation.

Make My Hard Disk Easy!

- ☐ Here's my order for _____ copies.
☐ Find my check for \$69.00 each enclosed (plus \$5.00 for postage and handling)
☐ Please charge this purchase to my ☐ Visa ☐ MasterCard *

Card # _____ Exp. Date _____

Name _____

Title _____

Company Name _____

Address _____

City _____ State _____ Zip _____

Texas residents add 5.125% sales tax. (Houston residents — 6.125%).
Outside U.S. please add \$15. Checks must be on a U.S. bank
and in U.S. dollars. Sorry, no C.O.D. or purchase orders.

Send to: PreCursor™
The David L. Aldridge Company, Inc.
140 Town & Country Village, Houston, Texas 77024

To place order card orders by telephone, call (713) 464-7465 or
toll free, call (800) 518-6151; in Calif. call (800) 612-3470 x822

PreCursor

PC Product Index

#	PRODUCT	ADVERTISER	PAGE#
OS/2 OPERATING SYSTEMS			
302	Brendon Box	1 Omega	252-253
302	QNX	Quantum Software Systems, Inc.	78
ACCOUNTING SOFTWARE			
472	Accounting	Bussman Tools, Inc.	55
472	Accounting	DAC Software	17
472	Accounting	H.B. & Compustats	312
472	Accounting	Multiplan	155
472	Accounting	Chart	157
472	Accounting	WordReady	158
115	Rose Software	Rose Associates	159
472	Accounting For Micro	The James River Group	208
INTEGRATED ACCOUNTING PACKAGES			
263	Integrated Accounting Packages	Macris Inc.	5
470	iBASE III Accounting	SBT Corp.	24
TAX AIDS			
518	Tax Surgeon	Taxbyte Inc.	225
123	Tax Software	Chap Soft	207
COMMUNICATIONS SOFTWARE			
326	CrossTalk	Macro Soft Inc.	160
OTHER UTILITIES			
173	Utility Software	Information Software	137
GRAPHICS SOFTWARE			
482	Macro Graphics	Analytics International Inc.	247
307	Graphmaster & Protractor	Graphic Communications Inc.	254
312	IMPROVISION	Micrographics	60
135	Graphic's Software	Spectra-Holaday	44
INFORMATION MANAGERS			
180	File Connection	Flagstaff Engineering	70
143	PMS II	North America Mkt. Inc.	230
103	Pop Up	North Edge	11
512	Time Slip	North Edge	213
PROJECT MANAGERS			
187	Project Planner	Proforma Systems	182
OTHER INFORMATION MANAGERS			
4	The Little Black Book	Cypnet Technology	91
SOFTWARE FOR PROFESSIONALS			
125	Software	Conroy La Porte	45
536	GEM	Digital Research	210-211
532	Time Slip	North Edge Software	213
BUSINESS SCENARIOS			
119	IBM Mathpak	Hamaguchi	10
159	287 Turbo B	MicroWay	86
28	Macro Cap and Macro Logic	Spectra-Soft	46
WORD PROCESSING SOFTWARE			
127	Word Processing With Mail Merge	Brewer Bag Software	59
512	Word Perfect	Sawtooth Software Inc. (TOSI)	200
251	Q&A	Symantec	188-189
249	Q&A	Symantec	192-193
518	WxWrite	NyQuest	309
WORD PROCESSORS			
385	Volunteer 3	Lefevre Software	230
179	PC Writex	Quick Soft	47
WORD PROCESSING AIDS			
378	Protheus/Letter Maker	Polaris	280
378	Random House Reference Set	Reference	83
MULTILINGUAL SOFTWARE			
144	Public Domain Software	PC Software Interest Group	231
306	Software	Generic Software	241
328	Four Public Domain Software	Public Domain Software	250
540	Ultra Pack	Tung	82
347	Masterware	Signis Design	32
INTEGRATED SOFTWARE			
4	Faithtrak	MicroWay	86
251	Q&A	Symantec	188-189
250	Q&A	Symantec	190-191
249	Q&A	Symantec	192-193
COMPILES			
156	Turbo Pascal/Holaday Packs	Borland International	141
142	Turbo Lighting	Borland International	147
147	Reflex	Borland International	143
139	Traveling SalesKick	Borland International	149
113	C Compiler	Lattice, Inc.	212
PROGRAMMER TOOLS			
313	Application One	LogiQuest	234
313	Programmer Tools	PC Brand	26-27
313	Programmer Tools	PC Brand	26-27
313	Macro/IT Debugger	MicroWay	84
329	Screen Scriptor	Software Building	85
329	Alter the Personal Pascal	Software Building	85
234	Turbo Professional	Sunny Hill Software	217
DATA BASE MANAGERS			
210	iBASE III	Advan-Tech	150-151
210	Knowledgebase II	Macro Data Base Systems	40
378	LabMaker	Polaris	280
378	R Base	Polars	280
251	Q&A	Symantec	188-189
250	Q&A	Symantec	190-191
249	Q&A	Symantec	192-193
PROGRAM DEVELOPMENT LANGUAGE PACKS			
246	iBASE III	Fox & Geller	90
113	Quick-C 1, 2, 3	Lotus	212
113	Top View Tool Bar	Lotus	212
530	Flashcode	Software Building	87
214	Better Basic	Sunsoft Software	63

#	PRODUCT	ADVERTISER	PAGE#
TEXT EDITORS			
184	STP PC	Command Technology Corp.	243
113	Screen Editor	Lattice	212
OTHER UTILITIES			
155	Copy & PC	Central Point Software	255
127	File Recovery System	Brown Bag Software	29
127	Fileways	Funk Software	98
155	Puffix II	Genco Engineering	67
344	Disk Mechanic	MLI Microsystems	242
346	Name Utilities	The Norton Utilities	216
346	Copywrite	Quint Software Ltd.	156
129	Phi Key	Rose Soft	1
389	Turbo Switch	Megabyte	303
IBM COMPATIBLE COMPUTERS			
325	Atlantic Computer Systems XT	Atlantic Computer Systems	256
320	High Performance Computers	GetSystem Microsystems	262
481	IBM Compatible & Accessories	Hi-Tech Computers & Electronics	138
270	PC AT	IBM Corp.	208-209
374	IBM Compatible System	PC USA	302
330	Turbo-Pascal Computers	Pascal Computers	183
326	IBM Compatible	Tech PC	266
ACCESSORY CABLES			
159	Number Scanner	Microway	86
106	Race Card	Mountain Computer Inc.	2-3
MULTIFUNCTION BOARDS			
104	Rangeport	AST Research	194-195
125	Multifunction Boards	Conroy LaPorte	45
462	Turbo	Orchard Technology	88
VIDEOGRAPHY HARDWARE			
239	Genex Spectris	Genex Systems Corp.	233
117	Genex Graphics Card	Paradise Systems	278-279
117	STB Systems	STB Systems	3
EXPANSION UNITS			
194	PC Expander	PC Horizons	249
159	Mega Page	MicroWay	86
125	Expansion Units	Conroy LaPorte	45
INPUT HARDWARE			
4	Mouse	Micro Soft	162-163
189	Uninterruptible Power Source	Emerson Electric Co.	246
521	Protronics	Microphonics	278
INTERFACE DEVICES			
478	Mouse	Maynard Electronics	36
MASS STORAGE HARDWARE			
525	Tape Backup Cartidge	Cartere Corp.	214-215
223	AT Plus	Core International	109
198	Pro-Cap	David Aldridge Co.	29
383	Hard Disk and Tape Backup	Empress Systems Corp.	226-227
234	Tape Backup Hard Disk	Empress Systems	104-105
453	Hard Disk	Protronics Diversified Intl.	12-13
453	Hard Disk	Protronics	242
453	Hard Disk	J&M Systems	242
COMMUNICATIONS HARDWARE			
244	Print Director Axx 6415	Digital Products	255
SCRAM			
364	PC Modem Half Card	VFN TEL	14
244	Print Director	Digital Products	255
NETWORKING			
519	Easy LAN	Serve Technology	271
519	MultiLink Advanced	Solvatec Link, Inc.	52
DISPLAYS/MONITORS			
489	Titan Monitor	Tatani	96
199	Protronics Monitor	Protronics Graphics	20
224	Protronics Monitor	Protronics Graphics	20
PRINTERS			
171	Mail Order Printer	Protronics	208
123	Printer	Conroy LaPorte	45
DOT MATRIX			
236	Alpha Dot Matrix Printer	Alpha America	168-169
PRINTS			
300	Frontier	Frontier	47
PLOTTERS, ETC.			
153	Data Display	Newton Packard	57
PRINTER UTILITIES			
373	Printer Boss	Connecticut Software	62
185	Letterix	Hammerhead	66
DISKETTES			
123	Diskettes	Conroy LaPorte	45
315	Mail Order Diskettes	Disk World	218-219
123	Diskettes	Diskette Connections, The	241
ACCESSORIES			
314	Accessories	Microcomputer Accessories	69
318	Accessories	Curtis Manufacturing	2-3
190	Accessories	C-The Products	216
318	Accessories	Micro Sys, Inc.	66
KEYBOARD/COVERLAYS			
318	PC Keyboard	Systems Management Associates	230
OTHER PERIPHERALS			
353	The Power Mouse	Togal	152
LITERATURE			
513	Books	Computer Info Ltd.	277
513	Software Guide	Look Up Corp.	277
212	General Reference	Simon & Schuster	4
ORGANIZATIONS AND SERVICES			
4	The Source	Source Telecomputing	202

Compuclassics

SOFTWARE

DATA BASE MANAGEMENT

ASHTON TATE
dBase III 389.00

BORLAND INTERNATIONAL
Reflex 55.00

FOX & GELLER
QuickCode III 145.00
QuickReport III 145.00
dGraph III 145.00

LEADING EDGE
Nutshell 79.00

M.O.S.S.
Knowledge Man (Version 2) 299.00

MICRODRIM
rBase 5000 359.00
Extended Report Writer 35.00

MICROSTUF
Infoscope 125.00

NANTUCKET
Clipper (dBase III Compiler) 359.00

WORD PROCESSORS

LEADING EDGE
with Merge & Spell 140.00

LIFETREE
Volkswriter Deluxe 145.00

MICROPRO
Wordstar 179.00
Wordstar Prolog 249.00
Wordstar 2000 245.00
Wordstar 2000 Plus 295.00

MICROSOFT
Word 239.00

MULTIMATE
Advantage 265.00
Executive 205.00
Just Write 95.00
Multimats 295.00

OVERON
Overon Omni-reader 599.00

SAMMA
Samta Word III 245.00
Samma + 339.00

SATELLITE SOFTWARE
Word Perfect 4.1 215.00

INTEGRATED SOFTWARE

ALPHA SOFTWARE
Electric Desk 199.00

ASHTON TATE
Framework 369.00

LOTUS
Symphony 435.00

SOFTWARE GROUP
Enable 339.00

SOFTWARE PUBLISHING
PFS Family 99.00
Write 99.00

Graph Access Plan Report 80.00 80.00 80.00 80.00

XANARO Ability 285.00

GRAPHICS

DECISION REBOUNDS
Chairmaster 230.00
Diagram Master 209.00
Signmaster 175.00

DIGITAL RESEARCH
Gem Draw 95.00

GRAPHIC COMMUNICATIONS
Graphwriter Combo 315.00

MICROGRAFX
In-A-Vision 259.00
PC Draw 245.00

MICROSOFT
Chart 155.00

MOUSE SYSTEMS
PC Mouse + Paintbrush 119.00

PROJECT MANAGEMENT

BREAKTHROUGH
Timeline (Version 2) 255.00

HARVARD SOFTWARE
Total Project Manager 245.00

MICROSOFT
Project 155.00

SCITOR
Project Scheduler Network 329.00

SORCIM / IUS
Superproject 239.00

SPREADSHEETS

LOTUS
Lotus 1-2-3 (Version 2) 345.00
Lotus Report Writer 185.00

MICROSOFT
Multiplan 129.00

SORCIM / IUS
Supercalc III Release 2 155.00

COMMUNICATIONS

HAYES
Smartcom II 95.00

MICROSTUF
Crosstalk XVI 99.00
Remote 99.00
Transporter 145.00

WOOLF
Move-it 95.00

ACCOUNTING

G.N.P.
C.P.A. + 355.00

I.U.S.
All Modules 309.00
Payroll 379.00
Easy Plus 99.00

Order desk & technical support open:
8 a.m. to 6 p.m. Monday - Friday
10 a.m. to 2 p.m. Saturday

OPEN SYSTEMS

All Modules 339.00
Business Basic Interpreter 165.00

REALWORLD
All Modules 369.00

PROGRAMMING LANGUAGES

BORLAND INTERNATIONAL
Editor 35.00
Gameworks 35.00
Graphix Toolbox 30.00
Jumbo Pack 125.00
New Pack 50.00
Turbo Pascal 3.0 35.00
Turbo Toolbox 30.00
Turbo Tutor 19.00
With 8087 59.00
With 8087 & BCD 75.00

DIGITAL RESEARCH
C Basic Compiler 369.00

LIFEBOAT ASSOCIATES
Lattice C Compiler 299.00
Run C 95.00

MICROSOFT
Fortran Compiler 229.00
Pascal Compiler 149.00
Macro Assembler 95.00
C Compiler 249.00

UTILITIES

BORLAND INTERNATIONAL
Sidekick 30.00
Sidekick (Unprotected) 45.00
Superkey 40.00

CENTRAL POINT
Copy II PC 29.00
Copy II Options Board 85.00
PC Tools 29.00

DIGITAL RESEARCH
Gem Desktop 32.00

FUNK SOFTWARE
Sideways 35.00

PETER HORTON
Norton Utilities 55.00

QUAD SOFTWARE
Zero Disk 95.00

ROSEBOLT
Prokey 99.00

SIMON & SCHUSTER
Typing Tutor III 32.00

UNISON
Printmaster 32.00

WARNER SOFTWARE
Desk Organizer 59.00

PERSONAL MANAGEMENT

CONTINENTAL SOFTWARE
Home Accountant Plus 82.00

LIVING VIDEOTEK
Ready 48.00
ThinkTank 99.00

MECA
Managing Your Money 105.00

MONOGRAM
Dollars And Sense 69.00

ADVANTAGES

- We welcome corporate accounts.
- Free technical support.
- Immediate replacement of defective goods.
- Bulk discounts.

HARDWARE

MONITORS

AMDEK
Amdek 310A 159.00

PRINCETON GRAPHICS
Max 12-E 169.00
HX-12 479.00
SR-12 599.00
Scan Doubler 179.00

PRINTERS

C. ITON
All Models CALL

EPSON
FX 85 375.00
FX 185 535.00
LQ 1500 899.00

OKIDATA
All Models CALL

TOSHIBA
1340 529.00
351 1275.00

MEMORY AND MULTIFUNCTION BOARDS

AST RESEARCH
Sisap Plus w 384K 235.00
Advantage w 128K 390.00
Megaplus II w 64K 265.00

GENOA SYSTEMS
Spectrum 309.00

HERCULES
Graphics Board 309.00
Color Card 149.00

PARADISE
Modular Graphics Card 265.00
Five Pack with B K 199.00

QUADRAM
Quadboard 54K 199.00

SIGMA DESIGNS
Color 400 425.00

MODEMS

HAYES
1200 B 369.00
1200 389.00

MISCELLANEOUS

KENSINGTON
Masterpiece 89.00

KEYTRONICS
5151 Keyboard 175.00

MICROSOFT
Mouse 129.00

Call for prices on IBM computer systems and for any item not included in this price list.

1 818 795-1895 US
1 800 231-6603 CA
1 800 328-4473 US

TERMS: All prices subject to change. No surcharge for VISA or MasterCard. 2% surcharge American Express. No returns without R.A.#. Short shipments must be notified with 48 hours. 15% restocking fee on non-defective goods; \$3.00 C.O.D. charge. Shipping \$4.00 per item, less on bulk orders. (\$3.00 Blue Label).

800-631-0962
00-521-6162

CIRCLE 516 ON READER SERVICE CARD

Learning Pascal

Both *Complete Turbo Pascal* and *Using Turbo Pascal* teach experienced programmers how to use Borland's Turbo Pascal compiler. Exploring Pascal resembles a first programming textbook.

Programming is the art of breaking down a problem into little self-contained tasks, solving each one separately, and then integrating them into a whole. Pascal is the ideal language for learning how to program. In fact, Niklaus Wirth invented Pascal for the very purpose of teaching proper programming techniques. The structural and definitional requirements imposed by Pascal force the programmer into a mental discipline that, with practice, becomes almost habitual. By comparison, learning how to program using BASIC is like learning how to drive in an amusement park bumper-car ride.

Borland International's Turbo Pascal is a fine learning tool because of the almost immediate feedback possible through the close integration of editor and compiler. The ease of use, the extensive library functions and procedures, and especially the low cost of Turbo Pascal have made Borland's implementation of the language very nearly a Pascal standard.

Two new books on Turbo Pascal, *Complete Turbo Pascal* and *Using Turbo Pascal* (the first of many, I'm sure), supplement Borland's disorganized manual by exploring the language in depth and supplying a lot of coded examples. A new book published by Ashton-Tate, *Exploring Pascal*, includes a disk with another integrated Pascal editing and compiling environment that in some teaching situations

may be an adequate alternative to Turbo Pascal.

The Language of Choice

Complete Turbo Pascal, by Jeff Duntmann, is obviously a labor of love by an author who combines his admiration for

complex topics, such as dynamic memory allocation and record structures, much too early in the book.

Complete Turbo Pascal delves into many of the more difficult areas of Turbo Pascal programming, such as the use of overlay files. His sample program illustrating overlays will serve as a good skeleton for any Turbo programmer forced to go the overlay route for a large program.

An astonishing 65-page chapter on "low-level machine hooks" will undoubtedly be eaten up by many Turbo Pascal enthusiasts interested in duplicating the magic normally possible only in assembly language. The largest complete program included in the book is a rudimentary paint program with a Microsoft mouse interface and some assembly language subroutines.

Although *Complete Turbo Pascal* has just a few complete useful programs, it contains a lot of little code nuggets in the form of procedures and functions that you can lift "as is" for your own Turbo Pascal library.

For the most part, Duntmann's book devotes equal time to the CP/M-80 and DOS versions of Turbo Pascal. Unfortunately, he doesn't cover the enhancements made in Version 3.0 of the Turbo Pascal compiler. His command-line parser (a program to access the command-line tail), for instance, is no longer required. He discusses the 8087 version only briefly in the context of floating-point storage and doesn't even mention the BCD (binary-coded decimal) version.

A disk with the *Complete Turbo Pascal* sample programs is available from Duntmann for \$10.

A Reference Guide

Steve Wood's *Using Turbo Pascal* is a better reference source than Duntmann's book because it includes a large section that discusses most of the built-in Turbo



Pascal structure with extensive use of the Turbo Pascal language enhancements. Very much in the spirit of Pascal, Duntmann often sternly lectures the reader about proper programming practices and systematic methods in approaching a programming problem.

In the book's large central section, entitled "Learning the Language," Duntmann discusses the various elements of Pascal in the order in which you might encounter them in a typical program. He doesn't like the gradual build-up approach that other programming texts usually follow to illustrate a language because it deludes you into believing that the approach is how programs are actually designed. Yet, Duntmann's approach isn't entirely satisfactory, either. It forces him to discuss



Complete Turbo Pascal
Jeff Duntmann
Scott, Foresman and Co.
Professional Publishing Group
1900 E. Lake Ave.
Glenview, IL 60025
(312) 729-3000
Copyright: 1986
Cover Price: \$19.95
ISBN: 0-673-18111-1
CIRCLE 694 ON READER SERVICE CARD

BOOK REVIEW

Pascal procedures and functions. However, it is not quite as much fun as *Complete Turbo Pascal* and lacks the enthusiastic tone I enjoyed in Duntmann's book. A distinct advantage to *Using Turbo Pascal* is the inclusion of Version 3.0 enhancements, but Wood mentions the BCD version of Turbo Pascal only briefly and ignores the 8087 version.

After an introduction that touches on most of the basic elements of Pascal, *Using Turbo Pascal* covers the language

PC FACT FILE

Using Turbo Pascal
Steve Wood
Osborne/McGraw-Hill
2600 Tenth St.
Berkeley, CA 94710
(415) 548-2805
Copyright: 1986
Cover Price: \$19.95
ISBN: 0-07-881148-1

CIRCLE 663 ON READER SERVICE CARD

more systematically. Most of Wood's examples are complete programs (as opposed to procedure or function fragments) and will be useful to someone actually typing in the code and trying them out. The programs are reproduced in very small type, so you may want to invest in the accompanying disk, available from the author for \$22.95.

Using Turbo Pascal mostly stays away from the machine-dependent features of Turbo Pascal (such as interrupt calls and directly accessing memory) that are guaranteed to make a Pascal program nonportable. The tables that show built-in functions and procedures always indicate whether the feature is part of standard ISO Pascal and whether it's supported by both the CP/M-80 and DOS Turbo versions.

Wood spends the last five chapters of his book (about one-third of the total) showing the steps involved in the development of a large and complex real-life Tur-

bo Pascal program. Although the material is not quite presented in the same order in which a programmer would approach the problem, it covers all the necessities: the pseudocode of the high-level functions, the gradual refinement process, the organization of data, and the assembly of "include" libraries for many of the lower-level tasks. (These "include" libraries could be useful in other applications.)

If you follow along, when everything is done you'll have a large, working Turbo Pascal program. Although I like the idea of illustrating the construction of a large program in steps, I was disappointed that the program put together in these five chapters does loan amortization. I won't deny that it's useful, but programmed loan amortization is hackneyed and frankly dull.

Turbo Pascal enthusiasts will want both *Complete Turbo Pascal* and *Using Turbo Pascal*. Obviously, their information overlaps, but they are different enough

FREE * DELIVERY

CALL:
1-800-
872-4727

PC 256K, 1/360K Floppy
10 MB Hard Disk



COMPAQ

256K, 1/360 Floppy, 10 MB Hard Disk



\$2,260.00

MONITORS

Amdek 310A	\$169.00
Taxan 121, Green	\$159.00
Taxan 122, Amber	\$165.00
TVM MD-3	
(Amber, Green, RGB)	\$449.00
COMREX CR6700 (RGB)	\$299.00

DISK DRIVES

INTERNAL HARD DISK (with controller)	
10MB Rodime (Compaq Upgrade Kit)	\$529.00
10MB 1/2 Height Shugart	\$395.00
20MB 1/2 Height Seagate	\$495.00
External Case	\$149.00

FLOPPY DISK DRIVES	
1/2 Height Mitsubishi	\$85.00

PC*USA Has It All

- Honesty
- Price
- Service
- Delivery

PC*USA
★STAR★
\$1195.00

- MS-DOS
- TAXAN MONITOR
- Parallel Port
- 640K Ram
- 2/360K Mitsushib
- Floppies

- AT Style Keyboard
- (Made in USA)
- 135W Power Supply
- Dual Speed
- Monochrome Board
- (Hercules Compatible)

COMPAQ

Portable Hard Disk System
256K 1/360K Floppy, 10 MB Hard Disk



\$2418.00

IBM

\$4359.00



Systems Include:
IBM AT and Keyboard, IBM 1.2 Meg Floppy, Panasonic 360K Floppy, Seagate (ST4026) 20 MB Hard Disk (40 MS Access Time)

TEAC 20MB Tape Backup \$839

PC*USA®

2003 108th St., Suite 301 Grand Prairie, TX 75050
214-641-6953 Metro 647-4008 Texas 1-800-441-0975
National 1-800-872-4727 Business Hours (M - F 9 - 6) CT

CIRCLE 374 ON READER SERVICE CARD

BOOK REVIEW

(and both good enough) to provide some valuable information and techniques, even for people already competently versed in Turbo Pascal.

However, neither Duntemann's nor Wood's book claims to be or actually is adequate for anyone who is just learning how to program. The organization of material in both books will completely baffle a beginner.

A New Compiler on the Block

But Turbo Pascal is not the only low-cost Pascal compiler around. *Exploring Pascal*, by Jeffrey Lill, includes its own Pascal pseudocompiler (with built-in editor) on a double-sided disk.

For \$49.95, this book and disk package may be ideal for low-budget Pascal instruction on IBM PCs because Turbo Pascal, Version 3.0, currently sells for \$69.95 and has to be supplemented with another book.

The *Exploring Pascal* pseudocompiler and editor is less sophisticated than Borland's Turbo Pascal. It does not produce .COM or .EXE executable files that you can run independently of the environment. Instead, it produces shorter files with a .EXX extension that require the included RUN program to execute. The editor may be fine for PC beginners, but people with editor experience will certainly groan over its separate insert-mode and command-mode orientation.

A nice feature of the environment is that you can call up help material to the screen while editing. The help screens include descriptions of all the statement types, functions, procedures, and data types supported by the compiler. Like the Borland compiler, an error puts you back into the editor with the cursor at the problem area;

the messages are more helpful and detailed than those in Turbo Pascal.

The *Exploring Pascal* text is geared toward the real beginner and looks like a good source text for a first programming course.

The reference section of the book reveals that the compiler's implementation of Pascal is more extensive than the material covered in the text. (For instance, the compiler supports dynamic memory allocation, which is not discussed elsewhere in the book.) In fact, it looks like a complete ISO standard Pascal implementation. The few enhancements include some screen

For \$49.95, the *Exploring Pascal* package may be ideal for low-budget instruction on IBM PCs because Turbo Pascal, Version 3.0, currently sells for \$69.95.

control that is, of course, incompatible with that used by Turbo Pascal. I wouldn't be surprised to see a second volume that covers the extra material missing from this edition.

The reference section has its own table of contents, but the book has no index—an unfortunate omission if the book is to be used for instruction. Like other Ashton-Tate publications, the print type in *Exploring Pascal* is large and the margins are generous, so the book looks much bigger than it actually is.

A book that approaches Pascal on the same elementary level as *Exploring Pascal* but that uses Turbo Pascal instead of Lill's more-restricted compiler would be very welcome and would help greatly in moving Borland's product into the classroom.

Although it is no longer necessary to program in order to use a computer, programming still has value to everyone. The skills of analysis and logic developed while doing programming are universal. In one sense, learning how to program is learning to think. ■

Charles Petzold is a contributing editor of PC Magazine.



Exploring Pascal
Jeffrey Lill

Ashton-Tate Publishing Group
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570

Copyright: 1985

Cover Price: \$49.95

ISBN: 0-912677-25-2

Disk Requires: 128K RAM, DOS 2.0 or later, one double-sided disk drive.

CIRCLE 689 ON READER SERVICE CARD

IBM PC AT USERS NEED



the
286 *TURBOSWITCH

- 33% FASTER
Runs at 8 MHz
- 100% COMPATIBLE
Switches to original 6 MHz

You would expect to pay more—
Megahertz offers these features
for ninety-nine dollars

MHz

We have the technology

MEGAHERTZ CORPORATION
P.O. Box 1289
Salt Lake City, UT 84110-1289
(801) 535-4374

CIRCLE 389 ON READER SERVICE CARD

**THE \$3.95
PERIPHERAL
THAT CAN
SAVE YOU
HUNDREDS OF
DOLLARS**



Before you shop for a microcomputer or peripheral, consult the CREATIVE COMPUTING 1985 BUYER'S GUIDE TO PERSONAL COMPUTERS AND PERIPHERALS.

It's a complete hardware sourcebook with comparisons of over 250 of the newest microcomputers and listings of over 75 peripherals including disk drives, modems, printers, plotters and much, much more. We provide in-depth evaluations of 23 of the most popular microcomputers to help you decide which is the best for you at a price you can afford.

Our 1985 Buyer's Guide will connect you with the best values in new computer equipment.

ONLY \$3.95

Available at your local newsstand
and computer store.

Resolved to finding one source for the lowest prices and best possible service?

Start 1986 right and end up with satisfaction guaranteed!

SOFTWARE

SPECIALS

Alpha Software	
Electric Desk	
(PC)	\$209
■ Arrays Tax	
Advantage	\$ 45
Enertionics	
Ennergaphics	\$209
■ Financier Tax	
Series	\$ 55
■ Howardsolt	
Tax Preparer 86	
(for '85 tax yr)	\$215
MOBS, Inc.	
K-Man 2	\$450
K-Man 2 Update	
Maier	\$220
Microsoft Excel	\$299

Alpha Software	
ESP	\$499
Keyworks	89
Ashion-Tata	
d-Base II	Call
d-Base III (v.1.1)	Call
Call Friday	\$170
Borland	
Sidekick	
(unprotected)	\$ 89
Turbo Pascal (v.3.0)	45
w/8087	75
Superkey	55
Connecticut Software	
Printer Boss (v.5)	\$ 99
Sidekick	45
Decision Resources	
Diagram Master	
..... New	\$279
Chart Master	215
Sign-Master	159
Digital Marketing	
Grammatik	\$ 60
Notebook II	149
Proofreader	42
Digital Research	
Gem Graph	\$185
Gem Wordchart	110
Gem Draw	105
Gem Desktop	39
Emerging Technology	
Edix (editor)	\$139
Prof Writers' Pkg.	319
Ennergaphics	
Ennergaphics	
w/Plotter Option	\$269
Fox & Geller	
Quick Report	\$159
Quickcode II or III	159
dGraph II or III	159
Pasky	35

FYI	
FYI 3000	\$259
Seri	89
Innovative Software	
Smart System	\$490
Other Products	Call
Lifetree Software	
Volkwriter	
Scientific	\$299
Volkwriter Deluxe	155
Living Videotext	
Think Tank (256K)	\$119
Lotus	
Spotlight (formerly	
from Software	
Art)	\$109
MOBS, Inc.	
K Graph	\$139
K Text	109
K Paint	85
K Report	139
K Mouse	89
Knowledge Man	258
Manlio Corp.	
In-Search	\$319
Pro Search	369
MicroPro	
WS ProPak (WS,	
CS, MM, SI)	\$255
Wordstar	175
Wordstar 2000	255
Wordstar 2000+	295
Microsim	
R:Base 5000	\$369
R:Base Clout (v.2.0)	129
Report Writer	89
R:Base - 4000	265
Microsoft	
Quick Basic Comp	75
Windows	75
Macro Assembler	99
Business Basic	
Compiler	289
Flight Simulator	39
Fortran Compiler	269
C Compiler	225
Chart	159
Mouse	135
McMath/MuSimp	
(DOS)	179
Pascal Compiler	199
Project	169
Multipan	
(MS/DOS) (v. 1.20)	129
Word (v.2.0) (DOS)	229
Microsoft	
Crosstalk (DOS)	\$ 99
Crosstalk (CPM)	139
Remote	119
Multimate Systems, Inc.	
Multimate (v.3.3)	\$229
Advantage	454
Just Write	111
On File	111
NWA - Quality	
Analyst	\$355

This is only a sample of the nearly 10,000 products we carry. If you're interested in something that is not listed, PLEASE CALL!

And don't forget to ask our sales people about our unadvertised specials.

1 800 826-1589

WITHIN WISCONSIN **1 800 472-3535**

INT'L TELEX: 260181 ORYX SYS WAU

Technical Support/Order Status/Custom Service:
Call (715) 848-1374.



Petar Norton	
Norton Util (v.3.0)	\$ 59
Oasis	
Word Plus	\$109
Punctuation & Style	99
Office Solutions	
Office Writer	Call
Open Systems	
All Acct'g	na
Progra	\$339
Open for Business I	449
Open for Business II	759
Paleidin	
Flashcalc	
(formerly Visicalc)	Call
Peachtree Software	
Back to Basics	
Acct'g System	\$219
Peach Pak 4	
(GL, AP, AR)	229
Acct'g Modules	319
Prentice Hall	
VCN Execuision	\$259
Executives	
Libraries	55
Rosacoft	
Prokey (v.4.0)	\$ 89
SPI Open Access	\$319
Satellite Software	
Word Perfect w/SP	\$239
Personal Word	
Perfect	119
Word Perfect Jr.	49
Sansable Designs	
d Programmer	\$199
Softcorp, Inc.	
PRO-JECT 6	Call
Softcraft	
Fancy Fonts (v.2.0)	\$135
Fancy Word	119
Softtronics - Softem	
PC	\$169

Software Group	
Enable	\$419
Software Publishing	
Jr. compatible	
PFS: File, Graph,	
Pien, Write,	
Access	ea. \$ 75
PFS: Report	72
Software Research	
Smartkey	\$ 35
w/FREE Smart path	
Star Software	
Accounting Partner	\$219
Acct'g, Partner II	599
Upgrades also avail.	Call
Sublogic Jet	\$ 30
Supersoft	
Make an offer on	
stock available	
Thoughtware	
Trigger	\$329
Warner Software	
(Jr. Compatible)	
Desk Organizer	\$ 63
Yard	
Adv. Property Mgmt.	\$659
Real Estate Tool Kit	199
Zylab	
Zylindex	
Professional	\$225
Zylindex Standard	114
Zylindex Plus	549

Zenith	
Entry level PC (ZF-148),	
2-360K floppy drives,	
128K ext. to 768K,	
switch 5 MHz to 8 MHz,	
1 serial, 1 parallel, RGB	
+ composite output,	
with MS DOS and NEW	
Zenith ergonomic	
amber monitor,	
complete for	\$1459
Zenith	
LCD or lightweight	
portable, advanced PC	
(AT compatible)	Call

PRINTERS

Epson	
..... Call	
NEC	
..... Call	
Okidata	
..... Call	
Quadram	
Quadrjet	\$395
Toshiba	
..... Call	
Cables	
..... and much more.	

FLOPPY DISK DRIVES

SPECIAL

CDC HiFlo Hi	\$ 89
CDC 1800	\$119
Tandon TM 100-2	
floppy	\$129
Tasc HiFlo Hi	\$109

COMPUTERS

IBM PC	
256K, 2-360K floppy drives	
& keyboard	\$1599
IBM PC XT, AT	Call

HARD DISK DRIVES

IBM Drives

10MB Seagate HD w/cntrlr. (1/2 high w/full face plate)	\$499
10MB Seagate HD w/cntrlr. (1/2 high w/full face plate)	399
10MB Tandem HD w/cntrlr. (full height)	499
10MB Tandem HD w/cntrlr. (1/2 high w/full face plate)	570
10MB Maynard HD w/cntrlr. (#2100A 1/2 high w/full or 1/2 hi plate)	699
20MB Seagate HD w/cntrlr. (full height)	589
20MB Miniscribe HD w/cntrlr. (full height)	759
19.1MB Tandem HD w/cntrlr. (full height)	710
20MB Rodime HD w/cntrlr. (1/2 height)	795
20MB Maynard HD w/cntrlr. (1/2 high w/full or 1/2 hi plate)	999

IBM AT Drives

20MB Seagate HD w/cntrlr. & rails (#4025 full height - 30 millisecond)	\$ 950
20MB Seagate HD w/cntrlr. & rails (#5T225 1/2 high - 80 millisecond)	550
20MB Miniscribe HD w/cntrlr. & rails (1/2 high - 80 millisecond)	660
20MB Rodime HD w/cntrlr. & rails (#202E full height - 55 millisecond)	699
30MB Rodime HD w/cntrlr. & rails (full height - 55 millisecond)	1069
30MB Seagate HD w/cntrlr. & rails (#4038 full height - 37 millisecond)	1099

Tape Back Up Systems

Alloy Computer Products PC Backup	\$1695
I-Omega 10 + 10M Bernoulli Box	2450
10M Bernoulli Box	1795
Bootable HD cntrlr.	250
Non bootable HD cntrlr.	115
Irwin Tape Drive #110D	595
Backup tape subsystem	850

Maynard

Maystream System 20 w/cntrlr. card #MS1101A	1270
Mountain Computers 27MB tape only	1799
Tecmar QIC-60AT Internal tape drive #811604	1495

Power Supplies

63.5 Watts power supply	\$ 69
130 watts switching power supply (PC)	109
200 watts switching power supply (PC-AT)	199

■ Indicates new products introduced in this ad.

SPECIALS

Asst Six Pak Plus

w/64K (S & P. Clk/ Cal. exp. to 384K)	\$229
Everex Tri Edge	\$325
Graphics Edge	355

AST Research

Knight Data Security Mgr.	\$230
CC-232	260
Preview Bd.	267
Advantage (AT) 128K	449
DCA Ima Board	Call
Hayes Transet 1000	\$329
Hercules Graphics Board	\$295
Color Card	195

Maynard Electronics

Floppy Drive Cntrlr.	\$119
Sender	Call

Paradise

5 Pak Board	\$179
Modular Display Card	285

Quadram

ZVM 136 13" 64K Clk/Cal. S & P)	\$199
Microfazer Stack Printer -RIP BK	139
-SIP & SIS BK each (exp. 64K only)	140
Quadboard Silver	Call
Quadboard Gold	479
Quadboard	Call
All Other Products	Call
STB - Chauffeur Bd.	\$295

Tecmar

Expansion Chassis.	\$879
Graphics Master	459
Maestro	439

PC JR. ACCESSORIES

SPECIAL

Keytronics KB 5149 Numeric Keypad	\$ 65
---	-------

Keytronics KB 5151 Jr.	\$169
Quadram Quad Jr. Exp. Chassis	\$395
Quad Jr. Exp. Mem. (for Chassis)	195
Tecmar Jr. Captain (128K, C.P.)	\$315
Jr. Cadet (64K)	169

MONITORS

SPECIAL

PGS HX 12 RGB Color	\$465
------------------------------	-------

Amdel

310A	Call
300 Cir	\$265
710 Cir	569

PGS

Max 12E	\$175
Quadram	Call

Sanyo

8112 12" HR Green	\$189
Tecmar Model 420L RGB	\$499
■ 420L RGB	544

Zenith

ZVM 136 13" RGB/LP	\$599
ZV 136 13" RGB	459
ZVM1220 12" Amber Monochrome Monitor	145
ZVM 1223 12" Gr. Mono	145
Cables	Call

MODEMS

SPECIAL

U.S. Robotics 2400 Micro Link Modem	\$485
---	-------

Hayes

Smartmodem 300	\$155
Smartmodem 1200	379
Smartmodem 1200B	369
Smartmodem 2400	Call
Quadram Quadmodem II	Call
US Robotics Password	\$309

Vental Hall Card modem	Call
■ Zenith ZA 1704 (for 171)	\$310
Cables	Call

DISKETTES

3M 5 1/4" DS, DO (Box/10)	\$ 25
------------------------------------	-------

Maxell

MD2-HD (diskettes for IBM-PC-AT, Box/10)	49
Ultra Magetics 5 1/4" DS, DO (Box of 10)	\$ 18

Verbatim

5 1/4" DS, DO (Box/10)	\$ 25
------------------------------	-------

MISC.

SPECIAL

Kensington Microvers Masterpiece Plus	\$155
--	-------

Electronic Protection

Devices Lime / EC-II	\$ 55
PeachEC-IV	45
Heuppage 80267 Chip	\$125
80267 AT Chip (5 Mhz)	219
Kensington Microvers Masterpiece	\$109
Keytronics KB5151 & Dvorak	\$169
■ 5153 Keyboard	309

Kurta - Kurta Pad

w/Styleus	\$750
Mousa Systems PC Mouse	\$159

Torrington

Manager Mouse 1001-C	\$149
Manager Mouse 1001-C AT	165

Touchstone Technology

Touchstone II (add-on keypad for IBM)	\$168
---	-------

Varia Computing

VariaWriter	\$239
-------------------	-------



POLICY:

- Wisconsin residents add 5% for sales tax.
- Minimum \$4.00 for shipping, handling and insurance for orders to \$200.
- For orders over \$200, add 2 1/2% for shipping, handling and insurance.
- For cash prepayment of orders \$200 or more, add ONLY 2% for shipping, handling and insurance.
- Prices are subject to change without notice.
- All items subject to availability.

PCAD 011486
PCAD 012886

WE WELCOME:

- Visa, MasterCard and American Express (No charge for credit cards)
- Corporate, government, educational volume purchasers, please ask for special accounts desks for additional discount
- COD (Add \$2.00 per box/parcel) Cash or certified check required
- Checks (Allow 1-2 weeks for clearing)

INTERNATIONAL POLICY:

We welcome foreign orders. Shipping and handling charges per order are actual shipping costs plus \$50 int'l handling fee. Canadian orders - please call. Telex: 280181 ORYX SY WVA.

WORKING HOURS:

Monday-Friday 8:30-6:00 • Saturday 10:30-2:00 • Central Time

Technical Support/Customer Service/Order Status: Call (715) 848-1374



T.M.

Oryx Micro Supply
CRAFTSMEN OF THE NEW TECHNOLOGY

425 First Street • P.O. Box 1961 • Wausau, Wisconsin 54401

CIRCLE 351 ON READER SERVICE CARD

A Division of Oryx Systems, Inc.

Index To Advertisers

RS #	Advertisers	Page	RS #	Advertisers	Page	RS #	Advertisers	Page	RS #	Advertisers	Page
230	Alps America	168-169	383	Express Systems	104-105	*	Microsoft	138	379	Quicksoft	67
307	American Micro Technology	256	180	Flagstaff Engineering	70	*	Microsoft	155	376	Reference	83
482	Analytics International	247	242	47's Computer	72-73	*	Microsoft	157	115	Rose Associates	159
114	Arlington Computer Products	233	246	Fox & Geller	90	*	Microsoft	162-163	129	Rose Soft	1
210	Ashion-Tale	150-151	247	Fox & Geller	92	326	Microsurf	160	512	Satellite Software	
104	AST Research, Inc.	194-195	317	Funk Software	96	390	Microsync, Inc.	256		International	200
325	Atlantic Computer Systems	256	255	Gen Electronics	201	*	Microway Inc.	84	470	SBT Corporation	24
107	Bay Express	239	266	General Technology	161	159	Microway Inc.	86	519	Server Technology	273
103	Bellsoft	11	506	Generic Software	241	344	MLJ Microsystems	242	347	Sigma Designs	32
150	Borland International	141	239	Genos Systems	237	160	Mountain Computers	2-3	302	Sison & Schuster	4
147	Borland International	143	525	Glenco Engineering	67	145	North American Mica	250	*	Softline	79
142	Borland International	147	368	Graphic Communications	204	126	Northwestern Software	22-23	529	Software Bottling	
139	Borland International	149	367	Graphic Communications	205	532	Northridge Software	213		Company	85
127	Brown Bag Software	59	320	Gulfstream Microsystems	262	346	Norton Utilities	216	530	Software Bottling Company	87
*	Business Computers, Inc.	261	260	H&E Computronics	312	514	Onc Computer Corp.	248	138	Software Channels, Inc.	95
472	Business Tools, Inc.	55	303	Hammerlab	66	492	Orchid Technology	88	393	Software Link, Inc.	52
118	C-TRU Products	216	119	Hauptpage Computer Works	10	351	Oryx Systems	304-305	*	Source Telecomputing	202
525	Centres	214-215	153	He-Jen Packard	57	*	Paradise Systems	278-279	136	Spectrum Holobyte	68
155	Central Point Software	255	481	Hi-Tech Computers & Electronics	238	310	PC Brand	25	495	Spectrum Software	28
121	Chip Soft Inc.	207	270	IBM Entry Division	208-209	313	PC Brand	26-27	517	STB Systems	C-3
184	Command Technology Corp.	243	377	Information Software	137	339	PC Connection	172-177	214	Summit Software	63
228	CompuAdd Corp.	310-311	202	Ionexia	252-253	194	PC Horizons Inc.	249	234	Sunny Hill Software	217
204	CompuLink	299	*	James River Group	206	245	PC Network	48-51	251	Symantec	188-189
490	Computer Dynamics	71	491	J & M Systems	242	471	PC's Limited	36-37	250	Symantec	190-191
513	Computer Information Limited	77	238	Kamenman Labs	16	179	PC's Limited	41	249	Symantec	192-193
182	Computer Mail Order	76-77	113	Lattice	212	144	PC Software Interest Group	231	*	Sygen Industries	42
196	Computer Mart	183	385	Lefteye	230	374	PC/USA	302	165	Systems Management Associates	238
175	Connecticut Software	62	282	Logisoft	98-101	330	Pecan Software Systems	183	489	Tacan	220
125	Coreco, La Poste, Inc.	45	181	Logisoft	234	521	Phoenix Diversified Ind., Inc.	12-13	115	Tanbyte	251
225	Cores International	106	*	Look-Up Corp.	187	378	Polaris	240	328	Tech PC	266
*	Curtis Manufacturing	94	263	Macola Inc.	5	187	Primavera Systems, Inc.	182	380	Tecmar Inc.	C2
*	Cypnet Technology	91	369	Magnum PC	225	199	Princeton Graphics	93	170	Telsoft	see Telemart
148	Dac Software, Inc.	197	237	Main Street Computer Corporation	30-31	224	Princeton Graphics	29	170	Telemart	268
198	David Alinder Co.	297-299	478	Maynard Electronics	39	371	Printers Plus	308	161	Telesolutions	64
244	Digital Products	255	151	MECA	39	103	Popular Programs	11	323	Texas Computer Systems	18
526	Digital Research	218-219	909	Megabyte	303	309	Progressive Micro Distributors	20-21	324	Texas Computer Systems	19
519	Discount Computer Centers	300	341	Micro Computer Accessories	69	300	Prosoft	47	353	Topat	152
*	Discrete Connection, The	241	310	Micro Data Base Systems	40	528	Public Domain Software	250	364	Topat	152
315	Disk World, Inc.	218-219	312	Micrografix	60	*	Quaid	136	364	Ventel	14
497	Electro-Comp	254	133	Micro Mart	244-245	392	Quantum Software Systems	78	*	Warehouse Data Products	274
311	Elicor Research	257	521	Microphonics	276	354	Quibie	103	152	Westlake Data Corp.	54
*	Emerald Systems	226-227	*	Microtron	74-75	483	Quibie	8-9	360	World Wide Access	307
189	Emerson Computer Power	246							518	XY Quest Inc.	309

PC MAGAZINE ADVERTISING SALES STAFF

Eugene Duncan - Advertising Director
 Pauline Scherer - Advertising Sales Manager/Telemarketing
 Miriam Hernandez - Assistant to the Advertising Director
 Advertising Coordinators: Robert Simpson, Jeanne Woodcock
 1 Park Avenue, New York, NY 10016 (212) 503-5100

MA, NH, VT, ME, RI, CT
 Kathy Kroschke - District Manager
 Boston, MA 02109
 (617) 367-7190
 John Bucknaghe - Account Representative
 (212) 503-5100
 So. NJ, DE, MD, DC, VA, WV, NC,
 SC, AL, MS, TN, AR, KY, PA, GA
 Bob Ostrow - District Manager
 1 Park Avenue
 New York, NY 10016
 (212) 503-5100
 Lauren Moore - Account Representative
 (212) 503-5100
 NY, No. NJ, FL
 Ellen Aukunot - District Manager

1 Park Avenue
 New York, NY 10016
 (212) 503-5100
 Joel Zuckerman - Account Representative
 (212) 503-5100
 NE, WI, IL, IN, MN, MO,
 OH, MI, IA, ND, SD, Canada
 John Hearnach - District Manager
 180 N. Michigan Avenue Suite 1400
 Chicago, IL 60601
 (312) 346-2600
 Michael Tsipajunjan - Account
 Representative
 (212) 503-5100
 Neil Miller - Western Advertising Manager
 CA (San Francisco & North), OR, WA
 Dave Regier - District Manager

11 Davis Drive
 Belmont, CA 94002
 (415) 598-2341
 Janet Bell - Account Representative
 (212) 503-5100
 CA (Santa Barbara to So. San
 Francisco), ID, MT, AK, NV
 Jeff Cohen - District Manager
 11 Davis Drive
 Belmont, CA 94002
 (415) 598-2341
 Jane Anderson - Account Representative
 (212) 503-5100
 CA (Orange County), AZ
 Paul Anderson - District Manager
 1601 Dove Street
 Newport Beach, CA 92660

(714) 76-0749
 Stan Johnson - Account Representative
 (212) 503-5100
 CA (Los Angeles & San Diego), HI
 Steve Lincoln - District Manager
 3460 Wilshire Blvd.
 Los Angeles, CA 90010
 (213) 387-2100
 Joanna Broome - Account Representative
 (212) 503-5100
 TX, OK, LA, KS, UT, NM
 Jennifer Bartel - District Manager
 5955 Sherry Lane
 Dallas, TX 75225 (214) 691-6934
 Joanna Broome - Account Representative
 (212) 503-5100

WE'RE NOT LIKE OUR COMPETITION

FREE DIGITAL WATCH
With the purchase of any floppy disk drive in this issue, we'll include a 7 melody alarm, Quartz chronograph, digital watch...absolutely FREE (limit one per customer)



- YOU LIKE IT, OR WE TAKE IT BACK!** If for any reason, you are not satisfied with any product you purchase, you may return it within 30 days of receipt for replacement, credit or a full refund.
- WE'LL PAY YOU IF YOU FIND A LOWER PRICE!** If you find a lower price in this issue before you buy, from any source that can deliver the same identical product, we'll beat it! If you buy any item from us at pricing in this ad and find a lower price from any source in this issue, that can deliver the identical product, we'll not only refund the difference you paid, but also pay you 20% of the difference for your trouble.
- GUARANTEED AVAILABILITY!** Any item you order will be shipped within 48 hours (normally 12) or you will be given a firm ship date when you order. If for any reason we cannot accomplish the above, we will deduct 5% from the price of the products shipped late and credit your order accordingly.



MODEMS

SMARTTEAM • 103/212A
Fully HAYES compatible
300/1200 baud
external modem . . . \$184

- HAYES 1200B . . . \$357
- NOVATION Smartcat 1200 internal . . . \$333

ACCESSORIES

KEYBOARDS
FULLY IBM and KEYTRON COMPATIBLE

- 5150 style . . . \$78⁰⁰
- 5151 style . . . \$98⁰⁰

PC POWER SUPPLIES
150 WATT . . . \$99⁰⁰
130 WATT . . . \$77⁰⁰

- MULTITECH multifunction board (AST xsupack + comp.) . . . \$119⁰⁰
- AST xsupack + . . . \$223⁰⁰
- AST Advantage 128K . . . \$384⁰⁰
- MULTITECH color board . . . \$94⁰⁰
- HERCULES color board . . . \$144⁰⁰
- HERCULES graphics board . . . \$287⁰⁰
- MULTITECH 384K internal exp. bus (IBM) . . . \$58⁰⁰

HARD DRIVES

COMPLETE INTERNAL SYSTEMS

Includes drive, controller card, cables and install procedures. Capacities listed are unformatted. We sell only the finest drives from Seagate, Mitsubishi, Tokai, Hitachi and others guaranteed to meet or exceed original manufacturer's specifications.

- 13MB . . . \$389⁰⁰
- 25MB . . . \$489⁰⁰
- 38MB SEAGATE VOICE COIL . . . \$899⁰⁰
- 51MB SEAGATE VOICE COIL . . . \$1098⁰⁰

Special Purchase



PRINTERS

YOUR CHOICE \$168⁰⁰

We bought the remaining inventory of two popular printer models from Legend. When they're gone, they're gone!

- **MODEL 880 Only 500 available!**
80 column, "Square Dot" matrix, 100CPS, Centronics Parallel, friction/tractor feed.
- **MODEL 1000 Only 200 available!**
80 column, "Copal" mechanism, dot matrix, 100CPS, Cent. parallel, friction/tractor feed.

- EPSON LX80 . . . \$248
- OKIDATA 92P . . . \$392

FLOPPY DRIVES—PC COMPATIBLE

- PANASONIC JA551 ½ Ht. . . \$84
- TEAC FD55 ½ Ht. . . \$88

- 2 drive PC floppy controller . . . \$45⁰⁰
- 4 drive PC floppy controller . . . \$58⁰⁰
- Name Brand 1MB 3 ½" . . . \$124⁰⁰
- APPLE II Compatible, inc. cable . . . \$97⁰⁰



COMPONENTS

256K DRAMS
Quality Japanese mfg. from companies like HITACHI, TOSHIBA and FUJITSU

Set of 9 150ns . . . \$26⁰⁰

- 64K DRAMS Set of 9 150ns . . . \$74⁹⁹
- 8087-3 . . . \$99⁰⁰
- 8087-2 . . . \$129⁰⁰
- 8087-1 . . . \$178⁰⁰
- 8088-3 . . . \$22⁰⁰
- 8088-2 . . . \$45⁰⁰
- 8088-1 . . . \$15⁰⁰
- 8086-3 . . . \$27⁰⁰

DISKETTES

FUJI

- 55/00 . . . BOX 10 \$13⁰⁰
- 05/00 48TPI . . . BOX 10 \$18⁰⁰
- 05/00 96TPI . . . BOX 10 \$27⁰⁰



NASHUA BULK DS/DD

Sold in increments of 50 only, shipped in poly bags

50	100-450	500-950	1000-4950	5000+
.88	.86	.84	.82	.80

NAME BRAND DS/DD

Grey Jacket, with reinforced hub. From a well known nationally advertised maker.

Sold in increments of 100 only, shipped in poly bags.

100-400	500-900	1K-4.9K	5K-9.9K	10K+
.65	.60	.56	.53	.50



MONITORS

TATUNG

- 14" HI RES R.G.B . . . \$444⁰⁰
- 12" GREEN . . . \$115⁰⁰
- 12" AMBER . . . \$119⁰⁰
- AMDEK Color 300 . . . \$266⁰⁰
- TAXAN 121 Green . . . \$136⁰⁰
- TAXAN 122 Amber . . . \$146⁰⁰

1-800-358-8881

THE FINE PRINT

Excluding software. Your authorization required. All items returned must be in original condition with cartons, packing and all manuals, etc. We accept Money Orders, Certified and Cashiers Checks and personal checks (personal checks check clearly). Visa and MasterCard with no surcharge and American Express. All products shipped UPS ground unless specified otherwise. All normal manufacturer's warranties apply.

WORLDWIDE ACCESS

Everybody hates us but our customers.

63114 DeSoto, WOODLAND HILLS, CA 91367
HOURS 8:30 AM - 5:30 PM PACIFIC TIME, MONDAY-FRIDAY

IF YOU DON'T SEE IT, CALL!

We have virtually any product available at the best price. Space limits us to only a fraction of what we sell. Call us for a quote and delivery information. If we don't have it, we'll get it for you!

CIRCLE 306 ON READER SERVICE CARD

PRINTERS *Plus*

User-Friendly Prices

800-562-2727



EPSON FX-85

\$339. WITH NLO
(REPLACES FX-80+)

Suggested Retail \$499

FX-185 WITH NLO WIDE CARRIAGE

(REPLACES FX100+)

\$459.

Suggested Retail \$699

- 160 CPS • IBM 5152 GRAPHICS
- NLO MODE • 8K BUFFER
- SELECTYPE™ • 160 TYPESTYLES
- ONE YEAR WARRANTY

Special Prices
On Options

EPSON LQ-1500



\$827.

Suggested Retail \$1295.

DRAFT TO LETTER QUALITY
IN ONE AMAZING PRINTER

- 24 Pin Printer • 67 CPS
- 200 CPS Draft Mode • Letter Quality

EPSON LX-80

Suggested Retail Price \$299

\$214.



- SPEED — 100 characters per second
- QUALITY — Near letter quality mode
- EASE-OF-USE — Choose popular types from top control panel with SelectType™
- VERSATILITY — Over 160 possible type styles. Mix text and graphics on the same line.

- WARRANTY — Epson's one year warranty

WITH
TRACTOR
FEED

LX-90

Suggested Retail Price \$329

\$219.

PIC Cable Interfaces Available For:

- IBM PC Emulates IBM 5152
- IBM JR Emulates IBM Compact
- ATARI Atari 1025
- APPLE IIc Emulates Epson LX-80
- GENERIC PARALLEL* Emulates Epson LX-80
- COMMODORE Emulates Commodore MPS 801

*Requires Cable

Qualified
Corporate &
Educational
Purchase
Orders
Accepted

NEW! EPSON LQ-1000 LQ-800

- 24 Pin Printhead • Built-in Parallel & Serial Interface
- 180 CPS Draft Mode • Font & ID Modules
- 60 CPS NLO Mode

NEW!

EPSON AP-80

for APPLE'S Macintosh • IIC • ILE

\$279.

Sug. Retail \$379.00

- WITH NLO • IMAGE WRITER COMPATIBLE
- TRACTOR FEED

Special Pricing For Qualified Resellers



DIABLO COMPATIBLE
DAISYWHEEL PRINTERS

EPSON-DX-10

\$219.

• 10 CPS • 1 YEAR WARRANTY Suggested Retail \$299

EPSON-DX-20

\$319.

• 20 CPS • 110 COLUMN Suggested Retail \$499

NEW! EPSON HS-80 LETTERJET



• 160 CPS INK JET
• PORTABLE or AC
• STANDARD PAPER
• NLO • EPSON CODE

\$310.

Suggested Retail \$499

COMREX™ ComRiter CR-420

PRICE BREAK!

HIGH SPEED PRINTER

- 420 CPS (Draft Mode)
- Rear and Bottom Paper Entry
- Print up to 8-part Forms
- Standard Friction and Tractor Feed
- Change Fonts and form length with the push of a button
- Quiet quality printing with a built-in sound enclosure

- Computer Compatible—switch between standard parallel and serial interfaces

Suggested Retail \$2,295

SPECIAL PRICE

\$1,281.

SPECIAL OFFER!
with printer purchase

PREMIUM DISKETTES

\$14.99 Suggested Retail \$39.95

COMREX

DS/DD

Ten in durable plastic case

1-800-562-2727

Or In Missouri! call: 1-314-227-4371



PRINTERS PLUS / 910 Clayton Rd., #217, Ballwin, MO 63011



SHIPPING AND HANDLING AT ADDITIONAL COST. (MC AND VISA AT NO ADDITIONAL CHARGE) OFFER GOOD WHILE SUPPLY LASTS. PRICES ARE IN EFFECT UNTIL FEBRUARY 15, 1986. SOME ITEMS MAY NOT BE AVAILABLE ON PUBLICATION DATE. ALL EQUIPMENT CARRIES MANUFACTURER'S WARRANTY. RETURNS REQUIRE PRIOR APPROVAL AND ARE SUBJECT TO A RESTOCKING FEE. ALL SALES ARE FINAL. WE CANNOT GUARANTEE EQUIPMENT COMPATIBILITY.

Free up Shipping!
Call Toll Free
1-800-531-5475

CompuAdd

"Personal Computer Products"



STANDARD BRAND PRODUCTS

PC/XT

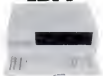
*Runs All Major
Software Written For
IBM PC & PC-XT*

- Intel 8088-3(4.77 MHz)
- MicroSoft MS-DOS 2.11
- 1-Half-Height Floppy Disk Drive

- 640K Ram
- 135 Watt Power Supply
- 8 Total Slots
- Standard Keyboard

\$695

IBM



PC & XT

PC w/256K; 2-Drives... **\$1589**
XT w/256K; 1 Drive **\$1849**

COMPAQ Portable

With 20 MB Hard Disk
• 256K • 1-Floppy Drive



\$2559

IBM

PC-AT



512K, 1.2 MB Floppy,
20 MB CMI, I/O Board

\$3995



Hard Disk Kits for the IBM PC

Convert your PC to an XT with
our hard disk kits. Complete with
and disk controller cables, modules, mounting
hardware and easy-to-use software.

One Year Warranty!

10 MB Hard Disk Kits... **\$395**
20 MB Hard Disk Kit... **\$479**
30 MB Hard Disk Kit... **\$679**

Hard Disk Kits for the IBM AT

- 38 msec Average Access Time
- Fully PC-AT Compatible
- Boots Directly From Hard Disk
- Includes Cables, Manual & Mounting Rails

High Performance,
Fast Access
Winchester Hard Disks

\$595 \$749
20 MB 30 MB

Hard Disk Kits for the COMPAQ® Portable

- 3 1/2" Shock Mounted Winchester Hard Disk
- Hard Disk Controller
- Cables
- Manual
- Software

\$469 \$579
10 MB 20 MB

AST SixPakPlus w/384K



\$249 New 2 Year Warranty!

STANDARD BRAND PRODUCTS

MFC



w/384K

\$129

Memory

3 Chips Per Set
1 Year Warranty!

48K... \$8
128K... \$29

AST Advantage!



w/128K

\$399

STANDARD BRAND PRODUCTS



AT-MFC

w/128K

\$299

Standard 5151 Keyboard



\$99

Standard FDC



\$49

Standard I/O



\$99

Standard MonoCard



\$119

Standard ColorCard



\$99

Hayes Smartmodems

300
1200B
1200
2400

\$159
\$359
\$359
\$699



hp HEWLETT PACKARD Plotters

HP7475 6 pen, size A & B... **\$1419**

HP7440 ColorPro 8 pen, size A. **\$1195**

Hercules

"Strong On Graphics"

Monochrome Graphics Card... **\$309**

Color Graphics Card... **\$165**

Intel

Math Co-Processor

8087 .. **\$119**

80287 .. **\$219**



PGS

Princeton
Graphic Systems

HX-12 Color Monitor... **\$459**

AMDEK
310A Monochrome Monitor... **\$159**

Hard Disk Chassis



Full Height... **\$149**

Half Height... **\$149**

Teac or Panasonic



\$95

IBM Printers

ProPrinter
\$479

135 Watt Power Supply



\$85

360K Floppy Drive for the IBM AT



\$109

CIRCLE 228 ON READER SERVICE CARD

Our Policy: All prices include fully insured, UPS ground shipping, on all orders shipped in continental U.S.A. No surcharge for VISA, MasterCard or UPS COD payments (Minimum purchase of \$50 on COD & net term orders). We accept fortune 1000 & institutional purchase orders on a net term basis (with credit approval) at no additional charge. Allow 7 days for personal check and company checks to clear.

Add 6.18% sales tax if a Texas resident. Prices are subject to change. All equipment carries a new factory warranty. All returned items must be accompanied by a return authorization number and subject to a restocking fee.

Corporate & Institutional Accounts Welcome: Our national accounts division is dedicated to providing the prompt professional service required to keep your business running smoothly. We accept P.O.'s on a net term basis, (minimum order \$50 please) offer next day shipping, free fully insured UPS ground shipment. We offer a full-time technical staff to answer any questions that might arise and to make fast repairs if needed. You'll notice the difference.

For product information, price quotes, technical support and orders call: (800) 531-5475 (outside Texas) (512) 250-1489 (within Texas)



12903-G Technology
Austin, Tx. 78727

Introducing the Most Powerful Business Software Ever!

FOR YOUR IBM • APPLE • MAC • TRS-80 • KAYPRO • COMMODORE • MSDOS OR CP/M COMPUTER*

OVER
100,000
SOLD



The VERSABUSINESS™ Series

Each VERSABUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

VERSARECEIVABLES™

\$99.95

VERSARECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSALEDGER II™ and VERSAINVENTORY™.

VERSAPAYABLES™

\$99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™ you can even let your computer automatically select which vouchers are to be paid.

VERSAPAYROLL™

\$99.95

VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

VERSAINVENTORY™

\$99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year to date sales reports, price lists, inventory checklists, etc.

VERSALEDGER II™

\$149.95

VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system without any additional software.

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

SATISFACTION GUARANTEED!

Every VERSABUSINESS™ module is guaranteed to outperform all other competitive systems, and at a fraction of the cost. If you are not satisfied with any VERSABUSINESS™ module, you may return it within 30 days for a refund. Manuals for any VERSABUSINESS™ module may be purchased for \$25 each, credited toward a later purchase of that module. (MS CP/M based Computers must be equipped with Microsoft BASIC (MSBASIC or BASIC 80).)

To Order:

Write or call Toll-free (800) 431-2818
(N.Y.S. residents call 914-425-1535)

- * add \$3 for shipping in UPS areas
- * add \$4 for C.O.D. or non-UPS areas

* add \$5 to CANADA or MEXICO

* add proper postage elsewhere

DEALER INQUIRIES WELCOME

All prices and specifications subject to change / Delivery subject to availability.

COMPUTRONICS

50 N. PASCADOCK ROAD, SPRING VALLEY, N.Y. 10977

CIRCLE 240 ON READER SERVICE CARD

STB puts an EGA *PLUS*™ in your hand ...*NOW!*

(We didn't join 'em
... we beat 'em!)

The Best Features:

Everyone's been talking about their Enhanced Graphic Adapters... but you don't want talk... you want product! STB's got it and STB is delivering EGA *PLUS*™ ... *NOW!!!*

STB's EGA *PLUS*™ is a universal video board that operates in 16 different text and graphics modes, and is compatible with the IBM Enhanced Graphics Adapter™. STB's EGA *PLUS*™ also provides 256K memory without need for the IBM Graphics Memory Expansion Card™ ... saving you money!

YOU COMPARE THE FEATURES:

STANDARD FEATURES	EGA <i>PLUS</i> ™	IBM™
Supports IBM PC/XT/AT™ and compatibles	✓	✓
Supports 640 × 350 for IBM's Enhanced Color and Monochrome Displays and compatible monitors	✓	✓
Supports full 16 colors in 640 × 350 on the IBM Enhanced Color Display™ and compatibles	✓	✓
Supports full 16 colors in 640 × 200 and 320 × 200 for the IBM Color Display	✓	✓
Parallel printer port	✓	
Soft scrolling, panning and windowing	✓	✓
Optional Clock/Calendar	✓	
Supports a light pen interface	✓	✓
Includes PC Accelerator™, STB's exclusive utility program which provides up to 10 disk emulators, 3 print spoolers and utilizes available system memory, PC/AT memory above one megabyte and EMS memory (Lotus™/Intel™/Microsoft™) through STB's Memory Companion PC™ board	✓	
Which board sells for 40% less than the other comparable product?	✓	

The Best Company

STB... born to be "Simply The Best". STB Systems, Inc. has dedicated itself since 1981 to designing and manufacturing the best in expansion products for personal computers.

Proven by performance, STB has earned the reputation in the marketplace of consistently providing the most asked for features in each of its expansion products, at a competitive price, "Simply The Best" in value on the market today.

STB carries this concept through from highly sophisticated board design... to no-compromise quality control in every phase of manufacturing... followed by full functional product testing, continuing through all aspects of documentation and support.

STB leaves nothing to chance to insure that we will remain at the leading edge of the marketplace producing innovative products of the highest quality, staying "Simply The Best". It's not easy, but it's worth it... to you and to us!

CIRCLE 517 ON READER SERVICE CARD

EGA *PLUS*™, Memory Companion PC trademarks of STB Systems, Inc. IBM, IBM PC/XT/AT™, IBM Enhanced Graphics Adapter, IBM Enhanced Color Display, IBM Graphics Memory Expansion Card registered trademarks of International Business Machines Corp. PC Accelerator trademark of RESICORP. Lotus trademark of Lotus Development Corp. Intel trademark of Intel Corp. Microsoft trademark of Microsoft Corporation

Simply The Best

STB
STB Systems, Inc.

601 N. Glenville, Suite 125 • Richardson, Texas 75081 • (214) 234-4100

The Experts in Accessories

Manufacturing Company

CURTI

PC
MAGAZINE
LIBRARY



Crystal Power Conditioner
150 or 300 Watt Models
Retail: \$179.95 and \$239.95



IBM PCXT System Stand Retail: \$49.95



Portable Pedestal:
For Compaq and IBM
Portables. Retail: \$64.95



Command Center: Controls
Up to 5 Peripherals.
Retail: \$179.95



PC Pedestal: For IBM PC Monochrome
and Color Displays. Retail: \$49.95



IBM, PC, PCXT System Stand:
Retail: \$24.95



Universal Base: Fits Most Monitors.
Retail: \$49.95



Extension Cable Set: For IBM PC Displays
and Keyboards. Retail: \$39.95 - \$67.95



Serial Modem Cable:
Retail: \$29.95

Parallel Printer Cable:
Retail: \$29.95



Safe-Ship Surge Protector:
Retail: \$29.95



Static Mat:
Dissipates Static Discharge. Retail: \$39.95



Curtis Surge Protector: EMI-EMI Filtering
Available. Retail: \$49.95 - \$89.95

Twelve Easy Pieces

Whether you need to get more comfortable, want guaranteed protection for your hardware and software, or need a system layout that's personalized to your requirements, Curtis makes it easy. After all, we're Curtis—the experts in accessories.

Curtis products are available nationally from leading Dealers, Distributors, and Retail Chains. In Canada: Micro-Computer Products, P.O. Box 235, Ajax, ONT, Canada L1S 3C3, (416) 427-6612

For the Curtis dealer nearest you call (603) 924-3823

Manufacturing Company, Inc.

CURTIS

305 Union Street, Peterborough, NH 03458